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S. HRG. 102–180

THE EMERGING TELECOMMUNICATIONS TECHNOLOGIES ACT OF 1991

~~R46-33~~

HEARING

BEFORE THE

SUBCOMMITTEE ON COMMUNICATIONS

OF THE

COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION
UNITED STATES SENATE

ONE HUNDRED SECOND CONGRESS

FIRST SESSION

ON

S. 218

TO REQUIRE THE SECRETARY OF COMMERCE TO MAKE ADDITIONAL FREQUENCIES AVAILABLE FOR COMMERCIAL ASSIGNMENT IN ORDER TO PROMOTE THE DEVELOPMENT AND USE OF NEW TELECOMMUNICATIONS TECHNOLOGIES, AND FOR OTHER PURPOSES

APRIL 11, 1991

Printed for the use of the Committee on Commerce, Science, and Transportation

STANFORD UNIVERSITY
NOV 1991
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U.S. GOVERNMENT PRINTING OFFICE
46–100cc WASHINGTON : 1991

For sale by the U.S. Government Printing Office
Superintendent of Documents, Congressional Sales Office, Washington, DC 20402
ISBN 0-16-035530-3

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CONTENTS

Page
Opening statement of Senator Burns 4
Opening statement of Senator Gorton 3
Opening statement of Senator Inouye 1
Opening statement of Senator Pressler 2

LIST OF WITNESSES

Carmody, John W., Deputy Director, Florida Highway Patrol, Tallahassee, FL 42
  Prepared statement 45
Cheramy, Edward R., President, IDB Communications Group, Inc 57
  Prepared statement 58
Gitten, Dr. Lawrence, Director, Wireless Architectures, AT&T Bell Labs 53
  Prepared statement 55
Haggart, Veronica, Vice President, Regulatory Affairs, Motorola 60
  Prepared statement 62
Nagel, Dr. David, Vice President, Advanced Technology Group, Apple Computer, Cupertino, CA 36
  Prepared statement 38
Obuchowski, Janice, Assistant Secretary for Communications and Information, Department of Commerce 11
  Prepared statement 14
Roehrs, Michael, President, FiberBox, Inc., Dallas, TX 30
  Prepared statement 33
Roos, Craig, Executive Vice President, Local Area Telecommunications, Inc 66
Schelle, Wayne, Chairman, American Personal Communications, Inc., Baltimore, MD 26
  Prepared statement 28
Sikes, Alfred C., Chairman, Federal Communications Commission 5
  Prepared statement 6

APPENDIX

Air Transport Association of America, prepared statement 71
American Public Power Association, prepared statement 71
Baker, Lloyd A., prepared statement 74
Bishop, Steven, Chief of Police, Kansas City, MO, prepared statement 76
Federal Communications Commission, in the matter of amendment of Commission's rules to establish new personal communications services 108
Fritts, Edward O., President and CEO, National Association of Broadcasters, letter from, to Senator Inouye, dated April 23, 1991 107
Harris, Robert M., National Telephone Cooperative Association, prepared statement 77
McCaw Cellular Communications, Inc., prepared statement 79
McEwen, Harlin, Chief of Police, Ithaca, NY, prepared statement 82
Meehan, Charles M., Executive Director and General Counsel, Utilities Telecommunications Council, letter from, to Senator Inouye, dated February 21, 1991 104
Roehrs, Michael, supplemental prepared statement 83
Roos, R. Craig, prepared statement 86
Rose, John N., Executive Vice President, Organization for the Protection and Advancement of Small Telephone Companies, letter from, to Senator Inouye, dated April 18, 1991 107
Worthy, Patricia M., prepared statement 101

THE EMERGING TELECOMMUNICATIONS TECHNOLOGIES ACT OF 1991

THURSDAY, APRIL 11, 1991

U.S. SENATE,
SUBCOMMITTEE ON COMMUNICATIONS,
COMMITTEE ON COMMERCE, SCIENCE,
AND TRANSPORTATION,
Washington, DC.

The subcommittee met, pursuant to notice, at 1:30 p.m., in room SR–253, Russell Senate Office Building, Hon. Daniel K. Inouye (chairman of the subcommittee) presiding.

Staff members assigned to this hearing: John Windhausen and Toni Cook, professional staff members; and Regina Keeney, minority professional staff member.

OPENING STATEMENT OF SENATOR INOUYE

Senator INOUYE. Good afternoon. This afternoon we will consider S. 218, the Emerging Telecommunications Technologies Act of 1991. The need to pass spectrum legislation has never been more clear. Our nation is facing a severe shortage of frequencies for the commercial development of new technologies, and over the years the United States has been very aggressive in allocating portions of the radio frequency spectrum for TV, radio, satellite, cellular telephone, and many other public services.

And now our aggressiveness has come back to haunt us. Almost all of the frequencies that can be used for new technologies have already been allocated, meanwhile many other countries are already deploying new technologies that may have no room to operate in the United States. We must solve this problem if we are to stay at the cutting edge of telecommunications research and development, and if our consumers are to be able to take advantage of the most efficient telecommunications services.

In addition, the United States has not engaged in the type of long-range spectrum planning that is necessary to make the most efficient use of the spectrum. All too often the United States has allocated spectrum on an ad hoc basis, and we also tend to award spectrum rights generously with little oversight of actual use, so as a result spectrum licensees have had little need or incentive to use their spectrum efficiently.

S. 218 addresses many of these problems. It would reallocate 200 megahertz of spectrum from the Federal Government to the FCC to contribute to new technologies and to local and State governments. This will ensure that entrepreneurs and innovators can find space on the spectrum map to bring their services to the public. S.

218 also establishes an advisory committee to make recommendations on how to make the spectrum allocation process work more efficiently. Finally, this bill authorizes the President to alter the reassignment of certain frequencies that are found to be essential to national security.

Our belief is that this bill recognizes and accommodates the legitimate concerns of the Department of Defense and many other Government agencies, and the committee has worked very diligently to shape this bill in a way that will avoid controversy and move this Nation's communication policy forward. Accordingly, I am pleased that the Department of Defense altered its position last year as a result of these changes and has decided not to oppose this measure.

At this point the only issue that may be controversial is the issue of spectrum auctions. As I have stated on several occasions, I do not believe that spectrum auctions are consistent with the notion that the spectrum is a vital public resource that should not be subject to the forces of the market. While I certainly understand the desire of some Government officials to find sources of funding for the U.S. Treasury, I do not believe that the interest of the public should be sacrificed at the altar of spectrum auctions, so I do not intend to allow this bill to be held hostage to a completely unrelated auction proposal. This afternoon's hearing gives us the opportunity to hear from a broad array of witnesses who have direct experience with the radio spectrum.

First we will listen to the Government agencies that are directly responsible for administering the spectrum, the chairman of the FCC, the Honorable Alfred C. Sikes and the Honorable Janice Obuchowski, Assistant Secretary for Communications and Information. We will then hear from several representatives of the private sector and local public safety organizations, and the committee looks forward to testimony from all these witnesses this afternoon.

Senator Pressler, do you have any statement?

OPENING STATEMENT OF SENATOR PRESSLER

Senator **PRESSLER**. Thank you, Mr. Chairman, for holding hearings today on S. 218 concerning radio spectrum for use by new technology. I congratulate you on this important legislation. This is a vital first step toward building the communication infrastructure needed for this Nation to be developed over the next decade. We need to ensure spectrum will be available to unleash new technologies providing instant personal communications.

These developing technologies will revolutionize both wire and wireless communications. The phone will no longer be tethered to a wire network. Phone calls will no longer travel wires to a location, but will travel over the spectrum of individuals.

This technology is important to South Dakota where ranchers and farmers spend their workdays miles from traditional phones. Personal communication devices mobile as a watch will allow them to be in contact whether they are on tractor or on horseback. The merging of the telephone computer and television into one telecomputer will empower individuals to manipulate and process vast amounts of data. These telecomputers will provide people in rural America with the ability to talk face to face over great distances, travel through audiovisual data bases and instantly access and store video products.

There is a problem with this vision of the future, however. The flood of information, these optoelectronic devices will produce must travel through channels built for a trickle. We are creating computers that will produce gigabits of information and are trying to stuff that into wires that can handle kilobits. The challenge we as policymakers face will be to ensure the communications infrastructure will be able to handle the flow of information these telecomputers will introduce. This legislation begins to address this problem. By opening up the spectrum to encourage development in mobile communications, voice conversations that now travel through copper wire and will be able to travel through the spectrum.

This shift will encourage the development of the fiber-optic infrastructure we will need to handle the video and data flow telecomputers will create. It is vital that both our Nation's wire and wireless infrastructures be built to encourage new technologies.

Senator INOUYE. Senator Burns.

Senator BURNS. Thank you, Mr. Chairman. I would ask if my full statement could be admitted for the record. I think our position on this is pretty well known. I want to thank you for holding these hearings and acknowledging that this great field of communications is a blooming one for this Nation, and your careful consideration of the policy that we make. And I also want to congratulate our chairman FCC chairman Mr. Sikes who made the proposal for the new spectrum reserve of 350 megahertz in new technology and reallocating, I appreciate that very much. And other than that I would just like to hear from the—seems like everybody makes statements around here. By the time we get our statements made it is time to go home, so if I could put my statement in the record and I appreciate you knowing these hearings.

Senator INOUYE. Without objection, so ordered.

Senator Gorton.

OPENING STATEMENT OF SENATOR GORTON

Senator GORTON. The legislation before the committee today would require the Secretary of Commerce to identify 200 megahertz of the spectrum which would be transferred from the Federal Government for use by the private sector. There is no doubt that this is an issue which needs to be addressed. America's future competitiveness in part depends upon the ability of companies developing exciting new technologies to obtain needed frequency for their operations.

The spectrum is a finite and extremely valuable resource. Its allocation must be made with careful planning and an eye toward tomorrow's needs. Whether or not users of the spectrum should be charged for the right to operate in a given frequency is an interesting question with huge ramifications for both current and future users. I will look forward to hearing all of the witnesses thoughts on this important issue.

Finally, I would like to thank Senator Inouye, the sponsor of this bill, for his willingness to work with me regarding my concern with the potential effect that this bill could have on electric ratepayers in the Northwest and on the reliable operation of our power system. I am delighted and very much appreciate the fact that Senator Inouye agreed to add a new section to the bill this year that will exempt Federal power agencies.

Senator INOUYE. Thank you.

Senator Burns.

OPENING STATEMENT OF SENATOR BURNS

Senator BURNS. Imagine this: In the future, the spectrum of electromagnetic energy will open to everyone as an instantly accessible avenue of personal connections in cellular telephony and other mobile communications. Such mobile communications will provide vital links between Montana ranchers and their herds on the plains. Telephones will become powerful pocket-size, wireless audio computers, offering digitally enhanced acoustics, speech recognition, and message storage.

In addition to such personal communications services, PCS, development of other new spectrum services from satellite based mobile services to digital audio broadcasting, DAB, and advanced television—the later of which could go a long way to assure the continued viability of our free over-the-air broadcasting system in America—will soon come on line.

Astounding in themselves, these new spectrum-based technologies will literally transform commerce. There is, however, a dark cloud hanging over this otherwise optimistic future scenario. Problems are increasingly appearing as the demands placed on the current spectrum system expand quite rapidly.

The current system with its protracted administrative procedures and inflexible regulation will stifle and retard the full development of the radio spectrum, which is an essential element of our Nation's communications infrastructure and an important national asset.

I want to commend our distinguished subcommittee chairman, Senator Inouye, for his visionary leadership with introduction of S. 218. As you know Mr. Chairman, I was the first member of the Senate to cosponsor your bill in the last Congress. I remain supportive of your efforts in the 102d Congress.

As I indicated during last year's hearing—and then again when an attempt was made to move the bill at the end of last session—I am also supportive of the Bush administration's efforts to lay the groundwork for spectrum reform by initiating competitive bidding.

There are numerous benefits that would be realized through competitive bidding including: one, public, rather than private, realization of economic gain; two, deficit reduction; three, more rapid delivery of services; and four, increased spectrum assignment efficiency and equity. I also believe we can address the "deep pockets" concerns raised by those opposed to competitive bidding by spreading the payments over time.

It is my great hope and desire that we can work constructively with the administration in crafting a compromise bill acceptable to both you, Mr. Chairman, and the administration—I think we can find middle ground.

Finally, Mr. Chairman, I would like to acknowledge the outstanding leadership being demonstrated in this critical area by our first two witnesses today. FCC Chairman Al Sikes has made a proposal for a new spectrum reserve of 350 megahertz for new technologies by reallocating current licensed operations. NTIA Director Janice Obuchowski's recent comprehensive spectrum study and legislative proposals are causing us all to rethink our previous positions.

I thank both of you and I look forward to your testimony.

Thank you, Mr. Chairman.

Senator INOUYE. Thank you.

May I now call on Chairman Sikes.

STATEMENT OF HON. ALFRED C. SIKES, CHAIRMAN, FEDERAL COMMUNICATIONS COMMISSION

Mr. SIKES. Mr. Chairman, members of the subcommittee, thank you for this opportunity to testify. I would ask that my full statement be submitted for——

Senator INOUYE. It will be.

Mr. SIKES [continuing]. Inclusion in the record. Let me emphasize that improving U.S. frequency management, encouraging communications innovation, and helping America competitiveness are major FCC goals. All the bills Congress is considering would privatize radio spectrum in the Government's frequency inventory. I believe such action would advance our goals and I support these bills' basic objectives. I am pleased to join you, Mr. Chairman, in support of this needed initiative.

Two approaches have been taken. S. 218 would establish privatization criteria procedures and mandate a shift of at least 200 megahertz of Government spectrum to the FCC. The administration bill also mandates the privatization of 200 megahertz of Government spectrum, but would condition privatization on authorization of an auction system.

Mr. Chairman, I have often stressed the need for additional radio spectrum to meet emerging communications needs. The past decade has seen substantial growth and demand, as new services such as cellular and air-to-ground radio telephone have developed. I know that in most frequency bands demand considerably outstrip supply.

Today new classes of potential radio-dependent services are materializing. These include personal communications networks. They also include services such as digital audio broadcasting and wireless local area networks for laptop and other computers. I don't need to tell this subcommittee that this is, in many respects, a good problem. It demonstrates the inventiveness of the American people. But without additional spectrum resources, we will face more and more difficult choices.

Mobile radio constitutes one of the best leverage technologies we have. And in an economy where productivity and efficiency have become national priorities, the need to expand access to these leverage technologies is growing. There are also important international competitiveness aspects to this. Britain, France, Japan, and others have identified mobile communications as a critical field. They have made channels available to support their companies. If we want to maintain our competitiveness, we need to take prompt action as well.

The FCC is doing what we can. We are improving our computer management systems. We are reviewing possible frequency reform—that is, a comprehensive overhaul of uses in certain bands. We are conducting a survey to determine whether we can establish a spectrum reserve earmarked to support new radio-dependent services. We are also devoting substantial resources in preparation for the International Telecommunication Union's 1992 World Administrative Radio Conference which will consider revising the international radio rules. Our goal is to achieve increased flexibility to accommodate emerging services and technology. With the additional spectrum these bills will provide, and success in our parallel initiatives, we will be in a good position to meet our country's radio-dependent communications needs.

In addition to supporting Government spectrum privatization, Mr. Chairman, I also support the administration's auction proposals. Today, when it comes to new services the FCC is restricted to essentially two approaches: first, we can conduct comparative license hearings, which typically take some years to conclude. Second, in a number of circumstances we can employ lotteries.

Auction procedures along the lines the administration's bill recommends would tend to ensure that channels go to those most likely to make the most efficient use of the resource. They would also provide for some payment to the public for the resource. The administration's bill would provide the FCC with the flexibility not to use auctions where there are over compelling public policy considerations.

As explained in Secretary Obuchowski's statement, the bill would also allow the FCC to establish a system equivalent to royalty payments which would ensure the ability of smaller entrepreneurs to fully participate. I believe this is a fundamentally sound approach.

In conclusion, Mr. Chairman, American business and customers need access to more radio spectrum. All the bills Congress is considering—coupled with the reform that the FCC is undertaking—will help assure that access. Thank you.

[The prepared statement of Mr. Sikes follows:]

PREPARED STATEMENT OF MR. ALFRED C. SIKES

Mr. Chairman and members of the subcommittee: Thank you for this opportunity to testify.

Let me emphasize at the outset that improving U.S. radio frequency management, encouraging communications innovation, and helping American international competitiveness are all cardinal Federal Communications Commission (FCC) goals. All the bills Congress is considering would "privatize" radio spectrum in the Government's frequency inventory. I believe such action would advance important FCC goals, and thus support the basic thrust of these bills.

TWO SIMILAR APPROACHES

Two approaches have been taken. First, there is the approach reflected in Chairman Inouye's bill (S. 218), and the peer bill which Chairman Dingell and Markey are cosponsoring in the House (H.R. 531). These measures, essentially, would establish the frequency privatization criteria and procedures. Both would mandate a shift of at least 200 MHz of spectrum resources from Federal Government uses to users which are regulated by the FCC.

These bills have extensive spectrum resource survey, reporting, and "reclaimer" provisions—that is, provisions allowing the Government to reclaim frequencies transferred to the private sector, if the national interest required. Other provisions are crafted to ensure this proposed privatization initiative occurs in a fashion consistent with sound policy and the overall national interest.

Then, there is the administration bill (H.R. 1407). It has been introduced in the House of Representatives by Congressmen Oxley, Ritter, and Tauzin. This bill is similar to the Inouye and Dingell-Markey bills. It, too, mandates the privatization of 200 MHz of Government spectrum. It also contains comparable safeguards. There is, however, one principal difference: the matter of auctions.

The administration bill, in effect, would condition frequency privatization on authorization of an auction system. In general, auctions would be required whenever the FCC might subsequently allot frequencies—whether within the proposed 200 MHz "retrocession" or other frequencies. Many frequency-related actions such as the renewal of existing licenses, or the grant of new public safety licenses would be statutorily excluded from the auction system. The overall approach, however, calls for shifting to an auction system—from the current comparative hearing or lottery approach—most new services.

The administration approach appears aimed at accomplishing several related goals in addition to making more spectrum available to private enterprise. It seeks to minimize the possibility of private "windfalls," as valuable frequency assets are disbursed. It also seeks to generate revenues, in part to reimburse the Government for any costs associated with vacating frequency bands and making them available to the private sector. The administration bill also aims at accomplishing a broad overhauling of the current way in which spectrum resources are licensed generally.

MEETING NEW COMMUNICATIONS DEMANDS

When I testified in support of the Dingell-Markey bill, Mr. Chairman, I stressed the need for additional radio spectrum to meet emerging communications requirements.

The past decade has seen substantial growth in private sector demand for radio spectrum. Demand for traditional private radio has grown. Entire new services such as cellular and air-to-ground radiotelephone have also developed. In most of the limited bands of frequencies now available for mobile communications, demand considerably outstrips supply.

Pressures on our supply of spectrum have been ameliorated in limited respects. Communications technology has continued to advance, for example, so it has become possible—using advanced trunking and related techniques—to squeeze more use out of a given channel. The rapid deployment of fiber optic communications networks has also lessened demand for additional microwave channels.

At the same time, however, whole new classes of potential radio-dependent services have materialized. These include the array of mobile communications clustered under the category of "Personal Communications Networks" (PCN's). They also include potential services such as digital audio broadcasting (DAB), and wireless local area networks for laptop and other computers.

The current demand for experimental licenses for new, innovative services provides an indication of the pressures the FCC's spectrum management process is now experiencing. Throughout the eighties, the FCC received scarcely one-half a dozen experimental license applications a year for such services. Since I first testified before Congress on the FCC's spectrum management challenges in 1989, however, our Office of Engineering and Technology has received about 60 applications—about 10 times the past annual levels. We have authorized 30 new systems, and are now examining ways to shoehorn in others—while, of course, new applicants continue to join the queue.

I don't need to tell this subcommittee that this is, in many respects, a good problem. It demonstrates the inventiveness of our people.

SPECTRUM SCARCITY CONSEQUENCES

Without additional spectrum resources, we will face more and more difficult licensing choices. More importantly, however, the potential competitiveness risks and opportunity costs placed on the American economy and consumers will grow.

Mobile radio constitutes one of the best "leverage technologies." In an economy where productivity and efficiency have become national priorities, the need for action to expand access to these leverage technologies is growing. At the same time, there are important international competitiveness aspects. Several of our leading international rivals—most notably Britain, France, and Japan—have identified mobile communications as a critical field. British, French, and Japanese frequency management authorities have made channels available to support their indigenous mobile communications companies. If we want to maintain our relative competitiveness, we need to take prompt action as well.

PARALLEL FCC ACTIONS

Making more channels available to the private sector, as all of these bills propose, is an important part of an overall solution to the challenges we face. But it is not the only part of the solution.

We need to do a more effective job of managing private sector use, and that is precisely what the FCC is trying to do. We are substantially improving our computer management systems. We are reviewing possible frequency "refarming" initiatives, which would entail a comprehensive overhaul of uses in certain intensely used bands. We are currently conducting a complete survey of frequency usage in the 1.8 and 2.2 GHz range, to determine whether we can establish a spectrum reserve earmarked to support new, radio-dependent services, We are also devoting substantial resources in preparation for the International Telecommunication Union's 1992 World Administrative Radio Conference, which will consider international radio rules. Our goal is to achieve increased flexibility to accommodate emerging services and technologies.

With the additional spectrum these bills would provide, and success in our parallel frequency initiatives, we will be in a good position to meet this country's radio-dependent communications needs. If our initiatives are not fully successful, however, and legislation along the lines of S. 218 is not enacted, both the FCC and American frequency users will continue to experience substantial pressures.

IMPORTANCE OF SPECTRUM AUCTIONS

In addition to supporting Government spectrum privatization, Mr. Chairman, I also support the administration's spectrum auction proposals.

Today, when it comes to new services, the FCC is restricted to essentially two frequency management approaches. First, we can conduct comparative license hearings—which typically take years to conclude, constitute a substantial drain on our resources, and usually cost the protagonists tens of thousands of dollars in legal fees. Second, in a limited number of circumstances, we can employ lotteries.

Lottery procedures lend themselves to a variety of potential abuses. Clever lawyers have devised an almost endless number of ways to "game" the system. More importantly, lotteries often are just a prelude to private auctions. Only a handful of lottery winners actually follow through and build a communications system. Instead, they usually sell their winning "ticket" to another. They receive a windfall. And, the public gets no payment in return for the disbursement of a national asset, the spectrum channels involved.

Auction procedures along the lines the administration's bill recommends would remedy these problems. They would tend to ensure that channels go to those most likely to make the most efficient use of the resource. They would also provide for some payment to the public for the disbursement of the resource.

The administration's bill would provide the FCC with the flexibility not to use auctions where there are other compelling public policy considerations. As explained in Assistant Secretary Obuchowski's statement, the bill would also allow the FCC to establish a system equivalent to royalty payments, which would ensure the ability of smaller entrepreneurs fully to participate. I believe this is a fundamentally sound approach.

NEED FOR ACTION

I appreciate the controversy which has arisen regarding the auction provisions of the administration's bill. I understand the temptation to pass legislation consistent with the current consensus on Government spectrum privatization, and to defer consideration of auctions. I urge the subcommittee to overcome that temptation, however, for two reasons.

First, this is the optimal time to resolve the issue. Radio frequency management is a complicated topic. Its very complexity, coupled with the array of other issues demanding congressional attention, tends to limit the number of times which Congress is willing, or able, to address the topic.

By virtue of your initiative, Mr. Chairman, which I strongly commend, Congress has now focused on spectrum management. Understanding of the issues is both good and widespread. If the auction issue is not addressed at this time, that intellectual momentum will be lost. It may be many years before Congress is able to grapple with this issue again.

Second, without auction authority, the effectiveness of your overall frequency privatization initiative may be partially blunted. Here, as in other communications arenas, time is truly of the essence. The initial privatization action which S. 218 mandates will take at least 18 months to 2 years to complete. Under existing law, in all likelihood, the FCC would then have to initiate and conclude a frequency allocation rulemaking. Even under the best of circumstances, that could take as long as 3 to 5 years. If, following that rulemaking, we are then required to employ traditional comparative hearing procedures to issue actual licenses, more years of delay could be added to the process. The absence of auction authority, in short, could compound the time lag, which is already built into our conventional administrative procedures.

The longer the administrative delay, the longer will be the delay in providing American business with the frequency resources it needs. And, the longer customers will have to wait to gain access to new, potentially very valuable communications services.

The American tradition of administrative due process already places us at some disadvantage relative to our rivals overseas. Auction authority would provide the FCC with the flexibility to reduce a significant part of the delay.

CONCLUSION

In conclusion, Mr. Chairman, American business and customers need access to more radio spectrum. All of the bills which Congress is considering, coupled with reforms which the FCC already has underway, would help us ensure that access.

The auction authority which the administration has recommended would also help us ensure that access in a timely and equitable fashion. That is particularly important if this commendable congressional initiative, which I support, is to be fully effective.

APPENDIX

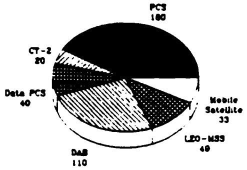
There are pending petitions and applications for over 400 MHz of spectrum.

- Virtually all the requested spectrum is now occupied.

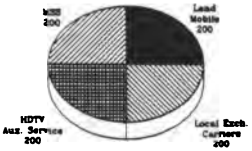
- Most requested spectrum is between 900 and 2500 MHz.

- Some of these requests are for competing services.

Demands on the Spectrum



Future Spectrum Needs



There are expressions of interest for future spectrum needs of approximately 800 MHz.

- Some of this interest may be obviated by spectrum saving technologies or movement to wire or fiber.

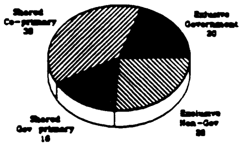
- New allocations may permit the reallocation of presently used spectrum.

Spectrum is allocated for Government, Non-government, or shared use.

- Spectrum below 1 GHz is heavily used, and not likely to be identified as assignable for domestic use.

- A more likely source of spectrum would be from the bands between 1 and 5 GHZ.

Percent of Government/Non-Government Spectrum Between 1 GHz and 5 GHz



Senator INOUYE. Thank you, very much, Mr. Sikes.
Secretary Obuchowski. Madam.

STATEMENT OF HON. JANICE OBUCHOWSKI, ASSISTANT SECRETARY FOR COMMUNICATIONS AND INFORMATION, DEPARTMENT OF COMMERCE

Ms. OBUCHOWSKI. Mr. Chairman and members of the subcommittee, thank you for the opportunity to testify on the Emerging Telecommunications Technology Act of 1991. I too ask for leave to submit my more extensive comments for the record.

Senator INOUYE. Without objection, so ordered.

Ms. OBUCHOWSKI. I am pleased to contribute to this hearing today on behalf of this administration. I commend Chairman Inouye for seeking to ensure that our valuable spectrum resource will be used more efficiently, thereby benefiting the U.S. radio communications industry as well as the American public and the economy at large.

As you know, NTIA's recently released report, "U.S. Spectrum Management Policy Agenda for the Future," addresses several aspects of this spectrum management policy. The implementation of the many recommendations in the report, copies of which have been provided, will promote the development and commercialization of innovative telecommunications products and services, including personal communications networks, digital audio broadcasting, and wireless local air networks such as that proposed by Apple computers. The report recognizes, however, that one of its key reforms, competitive bidding, may require congressional action, which brings me to the legislation you are considering today.

As you know in previous testimony I expressed opposition to the proposal to transfer spectrum from the U.S. Government to the private sector in the absence of explicit statutory authority for the FCC to assign such spectrum through competitive bidding. We oppose S. 218 unless amended to be consistent with the administration's concerns.

I am pleased to note that on March 12, 1991, Representatives Ritter, Oxley, and Tauzin introduced H.R. 1407 in the House the Emerging Telecommunications Technology Act of 1991. H.R. 1407 largely encompasses the elements of S. 218 and recognizes your leadership, Mr. Chairman, by providing for the transfer of a substantial block of Federal spectrum to non-Federal users. But it also lays the groundwork for significant spectrum management reform by initiating competitive bidding on a prospective basis and providing for additional spectrum planning and coordination between the FCC and NTIA.

Under H.R. 1407 and very similarly to your proposed legislation, a target of 200 megahertz below 6 gigahertz would be reallocated from U.S. Government use to non-Federal use. Initially, 30 megahertz out of the target 200 would be subject to distribution by the FCC through competitive bidding during the 1994–96 timeframe. All new assignments of spectrum would be subject to this process except for, and this is very important exception, those exempted in legislation, such as for public health and safety services or by subsequent FCC rulemaking granting an exemption for public interest reasons.

The legislation also excepts license renewals, which allows all licensees to invest in business and equipment for long-term productive spectrum use. Moreover, we believe a competitive bidding system can be a significant improvement over current procedures.

In the past months several States, including Alaska and Hawaii and the Federal Trade Commission have begun investigations of alleged abuse of the lottery system by private firms operating as "application mills." A competitive bidding process will do away with the "get-rich-quick" atmosphere that surrounds the current lottery system. Given the value of the spectrum, it is appropriate for U.S. public policy to focus on the means to ensure that the American public is the ultimate beneficiary. This kind of task, in fact, has long been applied by the United States with regard to other important public resources, such as grazing lands and oil and gas leases. Many private sector spectrum uses, indeed most, already employ the market for their own commercial purposes. In fact, the predominant method of acquiring spectrum for these and other services among the most commercially valuable is through market transfers of licenses.

In many respects the economic equivalent of purchases and sales of spectrum use rights. I would ask for leave to submit for the record a letter from former administrators if NTIA which reflect this concern about competitive bidding.

[The information referred to follows:]

LETTER FROM MESSRS. HENRY GELLER, DALE HATFIELD, AND RODNEY L. JOYCE TO SENATOR INOUYE

APRIL 11, 1991.

Senator DANIEL K. INOUYE,
U.S. Senate,
Washington, DC 20510

DEAR SENATOR INOUYE: As former Administrators of the National Telecommunications and Information Administration (NTIA), we coined in supporting legislation last year that would have transferred 200 megahertz of radio spectrum from Federal agencies to the private sector. Today we continue to support such legislation, but we also believe that the time has come for Government to reform the process by which it distributes spectrum to private licensees.

Legislation to release spectrum from Government to the private sector is still a good idea, but it should include language authorizing the FCC to distribute spectrum licenses at market prices, using competitive bidding processes. Doing so will be good fiscal policy and good communications policy, because it will move spectrum immediately into the hands of the parties most likely to use it and ensure that the proceeds will benefit the general public instead of few fortunate individuals.

NTIA recently completed a year-long inquiry and released its report, "U.S. Spectrum Management Policy: Agenda for the Future." We had known before that radio spectrum is scarce, but NTIA now estimates that the licenses for the 50 megahertz used for cellular telephone service alone have a market value between $46 and $80 billion. Giving away four times as much spectrum for nothing in lotteries or comparative hearings, as required under existing FCC procedures, would be fiscally irresponsible.

We recognize that the prospect of assigning spectrum licenses based on competitive bidding will arouse concern in some quarters that licenses will go only to those with deep pockets, but, as a practical matter, most commercial licenses end up in the hands of the highest bidders anyway. Under existing law the money goes to private parties who have been lucky enough to win lotteries or well-heeled enough to be represented by expensive attorneys and consultants in comparative hearings. Competitive bidding would replace blind chance and cumbersome and arbitrary administrative processes with an economically rational process that benefits the public at large.

We urge the Congress to study the cellular experience. The comparative hearing process proved to be cumbersome, expensive, and stultifying. The substitute lottery process is just as stultifying, attracting hordes of applicants with the winner of the "sweepstakes" then selling to the highest bidder. There is one central fact from this experience: there is an auction; the only question is whether it is to be a private or public one with the proceeds going to the Government for public interest use rather than into private coffers. For example, the sums gained could well be used to defray the costs incurred by Government users when shifting to other frequencies or to alternative media like optical fiber.

We also recognize that it would be inappropriate to include some categories of users in the competitive bidding process. Those classes of radio use can appropriately be exempted and protected, just as national parks and wildlife refuges are protected as a matter of land use policy.

In sum, we continue to believe that an orderly transfer of spectrum from the Federal Government to the private sector would be in the public interest. We endorse H.R. 1407, which incorporates competitive bidding for spectrum, and encourage the Senate to consider and adopt similar legislation.

Sincerely,

HENRY GELLER.
DALE HATFIELD.
RODNEY L. JOYCE.

Senator INOUYE. Without objection so ordered.

Ms. OBUCHOWSKI. In recent testimony before the House I illustrated this private market with a case of a cellular license in Cape Cod, MA. Those lottery winners were so lucky as to sell their license for $40 million within 4 months of receiving a construction permit. Cape Cod was a recordbreaking rural cellular deal. Urban have gone even higher, many higher, but it doesn't stand alone.

In 1990 alone a rural cellular license awarded by lottery for the big island of Hawaii transfer for $11.6 million 191 days after the construction permit was granted. The rural cellular license for Yuma, AZ, transferred for $9.1 million and in 205 days Saline, MO, the license transfer for $11.2 million in 122 days and in Lake, TN, the rural cellular license transferred for $18.1 million in 141 days. Little wonder that some 300,000 applications for rural cellular were submitted to the FCC and the walls in the cellular processing center in Gettysburg literally came tumbling down and had to be reinforced to deal with this burden.

The point for the American public, for the American taxpayer is simple, the spectrum is valuable public resource. The public should benefit from that value. The transition to the application of market mechanisms as outlined in H.R. 1407 would be the first step toward this goal.

In all other respects, the approach outlined in H.R. 1407 is not a major change from the way that the spectrum market presently operates. At a time when the budget deficit is a critical national problem we should not continue to unthinkingly give away billions of dollars of a public resource to private parties.

In our recently released spectrum study we concluded that the market value of cellular telephone spectrum alone is between $46 and $80 billion depending on what appraisal method you use. As you can see to your right, and my left, I brought with me a chart that shows how those amounts compare with other numbers that the Congress has addressed in recent months. The current market value of the assets that we gave away in cellular telephone lotteries alone ask greater than the total fiscal year 1991 deficit reduction achieved in the compromise budget measure adopted last October.

Greater than the reduction is in Medicare spending for the next 5 years mandated by the compromise budget measure. Greater than the amount budgeted for Federal farm, nutrition, and agricultural export programs over the next 5 years. And even greater than the cost of operation Desert Storm.

Mr. Chairman, our present method of licensing spectrum is a Government giveaway program, pure and simple. This is not a criticism of the FCC. The FCC is seeking permission from you to use competitive bidding processes to distribute these licensees. It uses lotteries because, as a practical matter, under the existing statute and given the great number of applicants, it has no other choice.

In conclusion, the administration believes that H.R. 1407 should be adopted because it incorporates the essential features of your proposal, including the reallocation of the significant block of spectrum from Federal to non-Federal use, while also providing the vehicle for applying market based principles. The competitive bidding provisions in this proposal will ensure that the entire public shares in the benefits of this valuable natural resource.

Mr. Chairman and members of the subcommittee, again I appreciate this opportunity to share my views and I am ready to respond to any questions you might have.

[The prepared statement of Ms. Obuchowski follows:]

PREPARED STATEMENT OF MS. JANICE OBUCHOWSKI

Thank you for this opportunity to testify on S. 218, the Emerging Telecommunications Technologies Act of 1991. I am pleased to contribute to this hearing today on behalf of the Administration. As you know, the National Telecommunications and Information Administration (NTIA), through Secretary Mosbacher, is the President's principal advisor on telecommunications issues and is the manager of the Federal Government's use of the radio spectrum. As such, NTIA has a vital interest in the issues you are considering today. I wish to commend Chairman Inouye and the Subcommittee for focusing on the future use and management of the radio frequency spectrum so that this significant, valuable national asset will be used more efficiently to the benefit of the U.S. radiocommunication industry, the U.S. economy, and the American public.

The radiocommunications industry provides innumerable radio-based services that foster the public well-being, that facilitate commercial activities, and that are the foundation of a broad and healthy telecommunications marketplace. While I need not educate this audience in the importance of radio-based products and services to the U.S. economy, it is worth noting that the Department of Commerce estimates that in 1990, U.S. businesses shipped more than $55 billion in radiocommunications equipment. Approximately $6.1 billion of these shipments were for export, contrasted with $3.8 billion in imports.

Spectrum use is also essential to the provision of Government service. Operation Desert Storm recently served as a forceful reminder of the critical role of spectrum to U.S. defense activities. Advanced applications of spectrum-based technology provided the U.S. military with the benefit of smart bombs, laser-guided missiles, night-fighting capability, secure command and control communications, and advanced reconnaissance and intelligence gathering, which were all so critical to our swift victory. However, the intensity of the Desert Storm operations should not cause us to lose sight of the more routine, but essential, activities of the Government. Many other functions and responsibilities performed in the broad national and public interest—such as law enforcement, public safety, aviation, and weather forecasting, just to name a few—also depend upon spectrum-based services.

Given the potential economic and societal benefits of continued development of radiocommunications, a pressing issue recognized by S. 218 is the need to accommodate both new and expanding services in prime portions of the spectrum—a matter that will be the focus of more than one hundred countries at the World Administrative Radio Conference in Geneva, Switzerland, in 1992. The United States thus faces the challenge of ensuring that future spectrum requirements are met and that U.S. policy fosters continued growth of the U.S. radiocommunication industry in this international context.

NTIA's recently released report, "U.S. Spectrum Management Policy: Agenda for the Future," addresses several aspects of U.S. spectrum management policy and makes recommendations that I believe will help to ensure this continued growth. The report recommends many reforms that NTIA is implementing, including increased public access to the federal spectrum management process. The report also calls for increased sharing among spectrum users, the use of market mechanisms to apportion spectrum among users, and numerous specific improvements to the spectrum management process.

The implementation of these and other recommendations in the report, which was distributed to each member of this Subcommittee, will promote the development and commercialization of innovative telecommunications products and services. The report recognizes, however, that one of its key suggested reforms,—that is, competitive bidding—may require Congressional action, which brings me to the legislation you are considering today.

PREVIOUS TESTIMONY

As you know, I previously testified on behalf of NTIA before this Subcommittee regarding prior versions of S. 218, and, last month, testified before the House Telecommunications Subcommittee on the current House version of this bill, H.R. 531. I expressed opposition to the proposal to transfer spectrum from the U.S. Government to the private sector in the absence of explicit statutory authority for the Federal Communications Commission (FCC) to assign such spectrum through competitive bidding. I am pleased, however, to note that on March 12, 1991, Representatives Ritter, Oxley, and Tauzin introduced H.R. 1407, the Emerging Telecommunications Technology Act of 1991, a bill that the Administration fully supports. H.R. 1407 addresses those elements of reform to the system that are missing in both S. 218 and its House companion bill, H.R. 531. My testimony before you today will specify in greater detail why we believe that Congress should adopt H.R. 1407.

THE PROPOSED SPECTRUM LEGISLATION

H.R. 1407 largely encompasses the elements of S. 218 by providing for the transfer of a substantial amount of Federal spectrum to non-Federal users, but it also lays the groundwork for significant spectrum management reform by initiating competitive bidding on a prospective basis, and by providing for additional spectrum planning and coordination between the FCC and NTIA.

Under H.R. 1407, a target of 200 megahertz (MHz) below 6 gigahertz (GHz) would be reallocated from U.S. Government use to non-Federal use to facilitate the offering of many highly desirable services. Initially, 30 MHz of the target 200 MHz would be subject to distribution by the FCC through competitive bidding during the 1994 to 1996 time frame. Revenues from competitive bidding would be paid into the U.S. Treasury. The remaining spectrum would be distributed to the private sector over a 15-year period. While an extensive analysis and our rationale for supporting competitive bidding can be found in the spectrum study, I wish to review the details and the benefits of the competitive bidding provisions in H.R. 1407 before turning to its other elements.

H.R. 1407, as currently crafted, provides a detailed, yet flexible framework for FCC implementation and oversight of competitive bidding for spectrum licenses, which would replace comparative hearings and lotteries for new frequency assignments, the approaches the FCC now uses when there are mutually exclusive applications for the same license.

Specifically, the legislation proposes competitive bidding only in the assignment process, where a particular entity is authorized to operate a particular service—not in the allocation process, where, through FCC rulemakings, frequencies are designated for operation of particular types of services.

Further, competitive bidding would only apply prospectively, to certain new licenses. As a result, adoption of this new regulatory regime would not disrupt the operations of existing licensees, or the potential sales of their businesses.

The legislation exempts from competitive bidding new assignments for certain services, such as for public health and safety purposes. Further, the FCC, through subsequent rulemakings, could exempt other services for public interest reasons. The legislation also exempts license renewals, which allows all licensees to invest in businesses and equipment for long-term productive spectrum use.

Successful bidders would still be required to operate under licenses with the same terms, conditions, and obligations that are in effect today. Thus, the "public interest" standards and obligations of the Communications Act would remain in place. Moreover, the FCC and NTIA would retain all of their present authority over spectrum use.

In supporting this competitive bidding regime, the Administration is well aware of issues raised about such an approach These issues include concerns that only those with "deep pockets" will be able to obtain spectrum, that wealthy users would improperly "warehouse" or "stockpile" spectrum, and that competitive bidding could hinder innovation. As NTIA discusses in detail in its spectrum report, a properly designed competitive bidding system can fully meet these concerns. Indeed, it is likely to be more conducive to healthy competition and innovation than the current system.

For example, competitive bidding could include royalty payments or lease-type payments spread over the term of the license, rather than—or as a complement to—up-front, lump-sum amounts. These approaches would make it easier for smaller, less capitalized firms to participate in the competitive bidding process. Because the exact type of payment scheme that is desirable may vary from service to service, our proposal would specifically authorize the FCC to address this issue and would provide it with the flexibility to specify the types of payments required. NTIA stands ready to work with this Subcommittee and the FCC to implement such regulations.

Moreover, we believe a competitive bidding system can be a significant improvement over current procedures, which can encourage warehousing and speculation. In recent years, lotteries, while an improvement for processing purposes over comparative hearings, have been shown to be seriously flawed. Alleged abuses of the lottery system by private firms operating as "application mills" have triggered investigations by several states under their consumer protection and securities laws. For example, Hawaii's Department of Commerce & Consumer Affairs and Alaska's Division of Banking, Securities & Corporations both recently alleged that certain sellers of applications for Multichannel Multipoint Distribution Service (MMDS) licenses are violating state security laws. In addition, just last week the Federal Trade Commission brought its first case against one of these firms alleging fraud in the sale of MMDS lottery applications.

In addition to its efficiency and revenue-raising advantages, a competitive bidding process will do away with the "get rich quick" atmosphere that surrounds the current lottery system. Even the word "lottery" conjures up the notion of "something for nothing." Comparative hearings, in theory designed to select the "best" applicant, often reduce the decision for awarding a license to a hair-splitting contest over applicants' civic and community affiliations, not over how well they will use the spectrum.

COMPETITIVE BIDDING WOULD BE IN THE PUBLIC INTEREST

In contrast, competitive bidding, as structured in H.R. 1407, would recognize the economic an the "public interest" value of spectrum. While it is difficult to place a precise dollar value on spectrum licenses, the market value of enterprises using spectrum provides some indication. For example, as NTIA's spectrum report discusses, analysis of the prices at which cellular franchises and cellular stocks are trading suggests that the total value of all urban cellular licenses in the United States is in the range of $46 to $97 billion. Similarly, analysis of the market prices of recently traded broadcast properties suggests that a conservative estimate of the total value of all broadcasting licenses would be about $11.5 billion.

Given the value of the spectrum, it is appropriate for U.S. public policy to focus on the means to ensure that the American public is the ultimate beneficiary, such as through a system of competitive bidding for spectrum. This concept has, in fact, long been applied by the United States with respect to other public resources, such as oil and gas leases.

At present, the extensive commercial value of the spectrum is generally realized by private licensees in the operation of their businesses. Value is realized directly when licensees sell air time—for such commercial activities as broadcasters' sales to advertisers, or cellular licensees to franchisers or subscribers—or indirectly, by increasing an organization's productivity.

The Administration believes that a market for spectrum licenses can promote economic efficiency. Under a market system, prices bid would better reflect the costs to society of spectrum use and those who most value the spectrum would be the ones using it. Because of the flexibility of markets, prices for spectrum could vary in different parts of the country and for different purposes. For example, in rural areas, where demand for spectrum is relatively low, prices could be low as well—for certain purposes, zero.

Many private sector spectrum users already employ the market for their own commercial purposes. There is presently a brisk business in sales and transfers of cellular franchises, other land-mobile operations, and radio and television stations. In fact, the predominant method of acquiring spectrum for these and other commercially valuable services is through market transfers of licenses—in many respects, the economic equivalent of purchases and sales of spectrum use rights.

In recent testimony on H.R. 531, I illustrated this private market with the case of a cellular license in Cape Cod, Massachusetts. A cellular development group "won" that license in a lottery and transferred it to Southwestern Bell Telephone Company 119 days after the FCC granted a construction permit for more than $40 million. While not all lottery winners are so lucky, these licenses do get traded, and for substantial amounts. In 1990 alone, a rural cellular license, awarded by lottery for the "Big Island" of Hawaii transferred for $11.6 million, 191 days after the construction permit was granted. The rural cellular license for Yuma, Arizona transferred for $9.01 million in 205 days. In Saline, Missouri, the license transferred for $11.2 million in 122 days. And in Lake, Tennessee, the rural cellular license transferred for $18.113 million in 141 days. Using competitive bidding for the assignment of these licenses would have permitted the public to realize the value that the ultimate recipients were willing to pay.

The point for the American public is simple. The spectrum is a valuable public resource. The public should benefit from that value. The transition to the application of market mechanisms outlined in H.R. 1407 would be the first step toward this goal. In all other respects, however, the approach outlined in H.R. 1407 is not a major change from the way that the spectrum market presently operates in relation to transfers of certain types of licenses. The basic rights and responsibilities of licensees would not change.

Revenues from competitive bidding could potentially make a meaningful contribution to Federal revenues. At a time when the budget deficit is a critical national problem, we should not continue to give away billions of dollars of a public resource to private parties. This is particularly true since these same parties demonstrate their willingness to pay for such spectrum through private sales on an almost daily basis. It is time that the average U.S. taxpayer, and not only commercial interests, realize some of the return from this valuable resource.

THE PROPOSAL WILL ALSO HELP MEET INCREASED DEMANDS FOR SPECTRUM

The other elements of H.R. 1407 focus on improved spectrum planning and will play a significant role in alleviating the growing "spectrum shortage" now facing this country. The tremendous growth in the demand for spectrum-based services is not expected to abate. In the last decade alone, we estimate that private sector authorizations increased by almost 64 percent, while during the same time, Federal Government authorizations increased by almost 61 percent. Most of this growth occurred below 6 GHz, which represents a mere two percent of the presently allocated spectrum frequencies (ranging as high as 300 GHz). In fact, NTIA estimates that domestically, approximately 93 percent of all radiocommunication use—both public and private—falls below 6 GHz.

As I mentioned earlier, the U.S. Government relies heavily upon spectrum-based services to perform many vital functions on the public's behalf, such as law enforcement, air traffic safety, disaster relief, electric power transmission, command and control of our military forces—and many more that I have not named. The U.S. Government shares 73 percent of the allocated spectrum between about 1 MHz and 6 GHz with private sector users, and many of the bands in which it operates are already quite congested. There is also strong new demand—particularly below 6 GHz for new and expanded services in the mobile and broadcasting fields, such as personal communication networks, digital cellular services, and digital audio broadcasting—just to name a few.

H.R. 1407 includes a number of provisions to help address pertinent issues regarding spectrum planning and management. For example, the proposal provides for increased coordination on national spectrum planning issues between the Department of Commerce and the FCC, including a requirement to make this process more open to the public. It also provides for the convening of a private sector advisory committee to develop recommendations on the process of allocating spectrum between the U.S. Government and other spectrum users. Many aspects of these provisions mirror provisions of S. 218.

NTIA IS COMMITTED TO SPECTRUM MANAGEMENT REFORM

Before closing I wish to emphasize that, while I am heretoday primarily to discuss those aspects of better spectrum management that will in some cases require legislative action, NTIA has a strong commitment 'as an agency to improving spectrum management. NTIA has started its own reforms, with the cooperation of Federal agency users in the Interdepartment Radio Advisory Committee (IRAC). Further, NTIA, which historically has worked closely with the FCC at the staff level on spectrum matters, is now seeking to coordinate even more closely, and at the highest levels. To that end, I have met with Chairman Sikes at the FCC specifically on spectrum issues and am seeking to formalize that working relationship. We are confident that such a formal relationship between the FCC and NTIA, which is outlined in H.R. 1407, will serve to improve U.S. spectrum management.

CONCLUSION

In conclusion, the Administration believes that Congress should adopt H.R. 1407, essentially a modified version of S. 218, because it incorporates the essential features of S. 218, including the reallocation of a significant block of spectrum from Federal to non-Federal use, while also providing the vehicle for applying market-based principles to the distribution of spectrum. The competitive bidding provisions in this proposal will serve to ensure that spectrum allocated to commercial use will be assigned in an efficient and equitable fashion and that the entire public will share in the benefits of this valuable, national natural resource.

Mr. Chairman and Members of the Subcommittee, again, I appreciate this opportunity to share my views with you, and I am ready to respond to 'any questions you may have.

Senator INOUYE. I thank you very much, Madam Secretary. Before I proceed with my questions I'd like to make this request. The Chair will not be asking any questions related to the recent decision on financial interest and syndication. I think that should come at some other time, if at all. I believe it is a bit premature to be discussing that at this moment. The committee has not seen the official published decision, and I gather that the process is still ongoing, so I would hope that the other members of the committee will restrain themselves and not discuss this matter. We have something equally as important pending before us.

Mr. Chairman, is the spectrum auction or competitive bid issue a do-or-die issue?

Mr. SIKES. Well, I don't make those kinds of decisions. I have certainly supported the spectrum auction. I think I outlined why. I think Secretary Obuchowski elaborated on that.

I would make one further statement and that is that in the kinds of services that we are talking about—for example, cellular, which I think makes up Secretary Obuchowski's chart—there aren't public service responsibilities as there are, for example, in the broadcast services. And the essential benefit, then, to the consumers is how quickly something gets built, and if somebody is bidding on the spectrum—whether for a lump sum or an annual royalty payment—they have got to do a business plan. They have got to calculate that in the business plan and then, of course, they have an incentive to very quickly deploy those assets, operate those assets so that the revenue stream can begin.

As things are now handled with the secondary selling of licenses, frequently that delays the service. I really believe, Mr. Chairman, and I recognize your historical position—and I would offer to have any kind of study done in terms of what we have done or have not done at the FCC—but I think in certain service areas, spectrum auctions would both further the public interest as well as provide revenue from this public asset. I apologize for taking liberty with your question, but in terms of whether it is a do or die, I just do not make that kind of a decision.

Senator INOUYE. Is it impossible for the FCC to set certain minimum standards for applicants so that it can weed out the obvious fast buck people?

Mr. SIKES. We do that. And I can't tell you that there isn't some additional layer that we could put on that does not today exist. But we do that today and what happens is the so-called application mills, or for that matter quite legitimate law firms, are able to, particularly with word processing, kind of boilerplate a lot of this. So, all of a sudden you have a huge universe of apparently qualified applicants, even though they might be lottery pools made up of dentists, doctors, lawyers, and, you know, I don't mean to pick on particular professions but——

Senator INOUYE. You picked some good ones.

Mr. SIKES. And, I want to say something else. I mean, I recognize—as you promote this kind of approach—that it is fashionable to be critical of the lottery method. But Congress authorized the lottery method because the comparative hearing method was taking so much time, because of the acknowledgement that in many of these services, you couldn't really make a cut between applicants on a comparative basis. And, when you made a decision, frequently it was litigated, so that delayed it even longer. So, I think to the extent that we can turn to alternative methods of assignment of licenses—I am not talking about allocation but assignment of license—then I think the lottery does serve a useful purpose.

Senator INOUYE. I think we can come back to the auction issue at some later time, but as of this moment I have a few other questions. On the 200 number, is that a reasonable number?

Mr. SIKES. Well, I have a difficult time stating that with concreteness. I believe, having been at NTIA for 3½ years, that that is a reasonable number. Whether it is too small or not, I don't know. And I know that there is an extremely competent group at NTIA which has really been put through the test in the last year, to work through the Interdepartmental Radio Advisory Committee, so I am going to assume for a minute that it is.

Ms. OBUCHOWSKI. Mr. Chairman, I would say from our vantage point it is a reasonable number, and for that reason we in the administration took your lead and targeted that number. When we look at the difficulty of accommodating all the conflicting demands on the spectrum, due to your leadership and good work with members of your staff, such as John Windhausen, I think there is a meeting of the minds. From our perspective 200 is a reasonable number and our area for dialog is on the method of an assignment of the actual licenses once the reallocation has been made.

Senator INOUYE. Mr. Chairman, are you satisfied at the way spectrum use is now being monitored?

Mr. SIKES. I believe we could do a better job if we had more equipment. Now, that is, I am sure, something you hear from a lot of different agencies, that we could do a better job if we simply had more money.

We do monitor the spectrum today. We have 35 field offices, but in terms of whether we could do a more intense job and, therefore, tell you more what you would like to know at any given point, it would take additional equipment to do that.

Also, monitoring the spectrum is quite difficult. It requires a high degree of analysis. For example, you might find a channel that seems vacant and yet because of the importance of what's communicated over that channel, you have got to keep it vacant most of the time because it could be used for an emergency. So, it is a very difficult process.

Senator INOUYE. At this point in time you are using the comparative hearing process for broadcast licenses?

Mr. SIKES. That's correct.

Senator INOUYE. Can you not use something like that for other users of the spectrum?

Mr. SIKES. I think it is quite difficult. In the broadcast area there are definitive comparative criteria that relate to diversity, integration of management and ownership. There are minority preferences, and so there are criteria other than whether the particular applicant is likely to run the business well.

Ms. OBUCHOWSKI. I would like to make a further point on that. Our numbers for 1990 indicate that in the year 1990 the FCC approved the sale, not the transfer from the FCC to a private applicant, but the sale from one private owner to another of 1,045 radio stations, 75 TV stations, and 60 station groups. The FCC itself, during that approximate period, was involved in the transfer of new licenses in 164 radio indications and 29 TV cases, mostly UHF, and no groups as we could locate from our research. So, essentially when you are looking at FCC licensing in the TV and radio area for new spectrum, that has slowed to a variable trickle when compared with some of the other licensing areas that we are looking at for the new services. In fact, in TV and radio right now much of the transfer is taking place in the private market, subject to a limited review under section 310.

Senator INOUYE. Under the auction process very likely the person or organization with the deepest pockets would very likely win. But that does not assure us that group of people may be the best qualified and so we will end up with the same problem, would we not?

Ms. OBUCHOWSKI. I guess my point was, and I was making the point that in the market as it now stands you see a circumstance where most of the transfers in the TV and radio area are essentially private sales. When you look at cellular, in many of the new services what is happening is the FCC makes the initial allocation, and then within a period of 100 to 200 days the lottery winner sells his or her license.

In all these cases the FCC makes some evaluation of the criteria of the individual applicant, but in virtually none of these cases are we assured of the ultimate superiority of the person. So you do have a private market now taking place across the board, and the question is who is going to be the beneficiary.

I think I would want to make the further point that the administration bill in specifically reserving sections 308 and 309 of the act, therefore, makes very explicit that anybody who becomes involved in such a competitive bid must meet the same character, the same public interest criteria. It also makes very explicit that the FCC can take back the license if there is any problem that would normally happen.

We are not talking about an irrevocable sale, we are talking about a way of taking the same license that would normally be taken through a lottery process.

Senator INOUYE. What if a proviso was added that would state, in essence, that if upon receipt of this award the successful applicant decided to sell, as you have indicated, if a sale is made, the Government takes 75 percent of the sale price?

Ms. OBUCHOWSKI. I think that would be something to be worthy of consideration, because, in essence, what you do have happening is that in most cases there is sale very quickly. When you have 300 or 400 applicants for any given rural license and a ball is pulled out of a drum, essentially, there is very little chance that the winner is going to be terribly committed to that market. As the situation has now developed, you do have the sale, so that is one possible way to address the issue.

Senator INOUYE. Thank you very much.

Mr. SIKES. Let me respond, if I might, Mr. Chairman, to that question.

Senator INOUYE. Sure.

Mr. SIKES. I would be more pessimistic about that and the reason I would be is I think if they knew the Government was going to get 75 percent of the proceeds, they would be less likely to sell. And one of the reasons that we allow this resale to take place is that we think there are a lot of people who just aren't serious about running a cellular business, for example, and so at least with the resale you get the license in the hands of somebody that is serious about it.

For example, McCaw Cellular is an example of a company that was largely built on buying frequencies in the secondary market, and they are clearly quite serious about operating a cellular business. So, I have some misgivings about incentives that would work against that license getting as quickly as possible into the hands of people that were deadly serious about building out the facilities and starting the business.

Senator STEVENS. Mr. Senator, on that one point?

Senator INOUYE. Certainly.

Senator STEVENS. And I want to say, Mr. Chairman, I have supported the concepts of auctions for a long time. Back in 1979 Senator Cannon and I have submitted a bill on that subject that we have never been able to succeed.

My question would be from the witness, What would you do with stock? I mean, most of these are traded around. You do not get cash, you get stock. You start putting together some of these groups, I think one of the ones that would have affected my State, I had a conversation with someone down at the FCC at the time on this—in this area, was a combination where a person had gotten one of these through these lottery processes the ability to go into the new type of telephones for Alaska and it was just up for bid, but part of it they wanted stock as well as cash.

Now, if we are going to take 75 percent, what are you going to do with that stock?

Senator INOUYE. Uncle Sam can keep it.

Senator STEVENS. I would hope that we would find some way to assure that the money that is available goes into the monitorization of the systems rather than into the treasury or into the pockets as a windfall of speculators. Thank you, Mr. Chairman.

Senator INOUYE. Senator Pressler.

Senator PRESSLER. Thank you, very much. But let me ask you from a technology standpoint what is the U.S. position in developing advanced communication systems of other countries from an international point of view? What are other countries doing and does what we do here today affect our ability to keep up on technology?

Ms. OBUCHOWSKI. Well, I would just want to begin by saying the problem we are dealing with today is the problem that comes from being very successful, as the chairman has pointed out. If you look at the cellular marketplace in the United States, we have approximately 5 million subscribers. Japan, which is obviously a cutting-edge country-type technologically has 500,000, so you are dealing with a population approximately one-half of the United States with 10 percent the number of cellular phones.

So we are successful. We are successful in cellular. We are successful in smart weapons, like the Patriot missile, which is highly spectrum-dependent. We are very successful with our advanced radars. We are successful with a range of baby monitors, garage door openers, and on and on.

The question really becomes how about the future. I think we are all in agreement that to remain on the cutting edge in the future we do have to free some spectrum, which is why we have a meeting of the minds here on the reallocation.

The problem that the administration has with the reallocation with no further procedural reform is, and I want to quote the former Democratic head of NTIA, Henry Geller, you are burning billions of dollars in front of 1919 M Street and it is a national disgrace.

Mr. SIKES. I don't know that there is a great deal I can add. I know that this is an area that has been targeted internationally both in Europe and in Asia because they have less successfully deployed and utilized spectrum in the past. They have more raw material available. And clearly the way markets develop domestically has an affect on how competitive their companies are internationally. So, I think there is a clear international dimension to this and I am very supportive of Chairman Inouye's initiative.

Senator PRESSLER. Now, there are some people that will say cellular telephone will move from its position as a complement to be the actual successor of wire service. Now, what would be the results if that were the case, and could you comment if you see any potential for cellular phones to replace wire phones?

Mr. SIKES. Yes, I think there is that potential. There is a great deal of research and development work going on today around what is generally called a personal communications networks and a family of personal communications devices which would utilize essentially spectrum, microelectronics, and the computer to disengage phone users from base stations. The thought is that there would be an ubiquity, that there would then be resulting economies of scale. It would create a service that was, in fact, competitive with today's public switched network, which is largely a wire-based network.

What do I think the implications are? I think the implications are that as these developments become more and more concrete, they're going to have an extraordinary force toward the modernization of the wire-based network so that it becomes more than simply a voice medium. I think that is good, and then I think there is going to be choice for the American consumer, and I think that is good.

Ms. OBUCHOWSKI. Bottom line, I think that personal communications, that the small radio person to person is probably going to be the liveliest alternative to the local loop we have seen yet in the next 10 to 20 years. That is part of our Nation's ethos to be a very mobile society. This is going to make it possible. Within 20 years you are going to have a situation where every individual business person in the country is going to be carrying one of these pocket phones. That is exactly why the 200 megahertz, which can be used for a multiplicity of reasons but likely would be used in large measure for personal communications, is so extremely valuable, and that is why when we raise these numbers about cellular, they are not wholly arbitrary or unrelated to the issue that we have at hand.

Senator PRESSLER. Thank you, very much.

Senator INOUYE. Are you predicting that all of us will be carrying telephones?

Ms. OBUCHOWSKI. Unless we just cannot stand it.

Senator INOUYE. It is bad enough with beepers. Senator Burns.

Senator BURNS. I would step aside and let my friend Senator Stevens speak. He wants to make an announcement and I think that would be proper.

Senator INOUYE. Senator Stevens.

Senator STEVENS. Aren't these juniors very nice, Senator? My staff has informed me that I have been requested to introduce this administration's bill in the Congress and I intend to do that.

I do have some reservations concerning access for rural America and also the question of what burdens are being placed on broadcasters and other financial strains and I have indicated before I do believe the provisions we worked out in the 1979 bill which included the authority for FCC—the FCC to use any method, including sealed bids and auctions, to determine values of licenses ought to be pursued and that we ought to find some way to get some flexibility in this.

I appreciate your bill and the approaches taken. I do think we ought to find a way to marry the administration's approach, that and your bill, and see if we can be successful this year in dealing with this. I do not think we ought to be delayed because of the issue of auctions, but I think we ought to settle it on the basis of giving the FCC the authority that is indicated. Thank you very much.

Senator INOUYE. Thank you.

Ms. OBUCHOWSKI. Thank you. And I would like to observe on the issues of broadcasters that as it now stands the bill excludes incumbents, so even now we are talking about a situation where there would not be much impact on existing broadcasts and no impact on transfers. But, on the broader issue of broadcasters, we are certainly open to dialog.

Senator INOUYE. Mr. Burns.

Senator BURNS. Thank you, Mr. Chairman. I guess I have some concerns, and yet in an auction, I have been around those things all my life and I think Chairman Sikes, who comes from down in southeast Missouri, has been to auctions and—of other goods and merchandise, and it has always been my experience over the last 25 years that, sure, you always have speculators that show up at the sale, but you also have some people that show up at the sale that is going to use that spectrum, and when they bid it for what it is worth, speculators say, "well, that might be what it is worth that day" and they have a habit of standing aside because they do not want to tie up a lot of money to do a lot of trading on it.

It takes a pretty good trader to out guess the people that are actually going to use the product. And so the method does have a way of weeding out the Johnnie-come-latelies or the speculators, no matter how fancy they be. As a matter of fact, I think probably there has been more money made in the private sector after the spectrum was reallocated out of the FCC, they had their own auction even the way it is done now, and we did not get to participate in that either, but I have some concerns and I think they are the same concerns you have.

I also serve on a small business committee and I have concern about minority ability to get into the free enterprise system, and sometimes I think we deal with those entries in the business for some people that may be are not the wealthiest people in the world and would like to be, and that is a great thing about this country. And we also have some concerns about our minorities that want to get into this system and make a go, so I have a couple of questions that I want to see how you would address the question of only the richest will be able to get spectrum licenses, and also requiring applicants to pay for the right to use a spectrum if it creates a barrier to entry for minorities or disadvantage of those in rural areas. I mean, that is still a concern of mine and I think it is still a concern of Senator Stevens.

Ms. OBUCHOWSKI. I would like to offer that that is a concern I think we all share and Chairman Sikes advanced the idea which I think now, we in the administration, are very fond of. If we were to go to such a competitive bid approach, you wouldn't need to go to a lump sum up front. I mean, in the oil and gas area there is a initial earnest money type of payment made, but then it is a royalty over the life of the lease, so it really isn't dependent on how rich you are but rather how ably you think you are going to be able to make use of the resource.

So, there are ways of doing a competitive bid that do not skew toward the wealthy, and I think that is one reason why the administration's bill is very explicit in giving FCC the authority to do a rulemaking to take these things into consideration. When we expressly exempt the 308 and 309 criteria, we leave open the possibility of the FCC in some way doing a wading or whatever it might want to address, character or even minority issues if that were the FCC's decision.

I finally want to make the point that when you look at the system as it now stands, where you have a ball pulled out of the drum and then people bid outside for the resource in the private market, that does not advantage the middle income person. Indeed, last time I saw, there were very few struggling but able minorities or garage entrepreneurs that were able to pay Dick Wiley's hourly rate.

Senator BURNS. They are always around, are they not? They are always around.

Chairman Sikes, I, just to maybe clarify in my mind and for the committee, the disadvantages of using comparative hearings and lotteries for issuing the spectrum licenses, if we operate—and that is the system we are operating now. How cumbersome is it on your commission?

Mr. **Sikes**. Let me observe at the outset, since you got a side bar at the beginning, I bought calf pairs for $5.50 at an auction and sold them for $3.50 a couple years later.

Senator **Burns**. You are going to do well in the cattle business.

Mr. **Sikes**. I am not going to do well in the cattle business because I am not going to again get in the cattle business.

Senator **Burns**. I talked to a good friend of mine out in Texas and I said what is your secret of success and he says only sign checks on the back, so you want to keep that in mind, too.

Senator **Inouye**. That is my boy.

Mr. **Sikes**. The difficulty that is faced in the comparative process is that it is a very labor-intensive process. You know, the advocates for the various applicants are quite skilled in determining how they can get their applicant to appear to be the best qualified applicant given whatever the criteria are. It is a very difficult judgment, then, for the administrative law judge, if it advances to that point, assuming that other applicants are not bought out in what is essentially a private auction, although we have now stripped that option away in some reform that we did about a year ago. Then, when an administrative law judge makes a choice, that can be appealed to our review board, and then ultimately to the Commission and ultimately into the courts. So, for example, we have got a number of rural cellular licenses hung up right now in litigation.

This, of course, is going over to the lottery area, but it is much easier, I think, to game either the comparative processes or the lottery processes and, therefore, slow the provision of service.

Senator **Burns**. The 200 megahertz that will be made available, and I would address this to either one of you, what—have you put a worth on that?

Ms. **Obuchowski**. Sir, we have not yet because we are going to leave it to the FCC, if such a transfer were made, to decide what services would be in the best interest of the country. If some of that resource were devoted to one of the governmental services, that would not even be subject to a competitive bid. If it were open to something like personal communications or cellular, the figures that you have up on the left-hand side—to my left would be applicable. .

I have figures here that I would be happy to submit for the record from Cellular Investors, September 18, 1990, saying cellular deals come about. It is an article basically complaining that the economy has put the cellular market into the doldrums and, that, in the last year sales for markets where price data was available, totaled up to an estimated $13.5 billion, only, so we are talking relatively large dollars in certain services.

Senator **Burns**. We may be getting redundant in our questions here, but I would add that I want to—I appreciate the study you did and the step forward you take in this area of dealing with spectrum and I think you have done some awfully good work and laid the groundwork, and that is all the questions that I have, Mr. Chairman. Thank you very much.

Senator **INOUYE**. Thank you very much. I participated in an auction but once. I bid the upset price and it was so embarrassing after that.

Senator **BURNS**. Well, everyone that comes to an auction, you know, we assume that they are 21.

Senator **INOUYE**. Thank you very much, Madam Secretary, Mr. Chairman.

Mr. **SIKES**. Thank you.

Ms. **OBUCHOWSKI**. Thank you very much. This is an important topic and we appreciate it.

Senator **INOUYE**. We will try to work something out here.

Ms. **OBUCHOWSKI**. I thank you.

Senator **INOUYE**. Our next panel consists of the chairman of American Personal Communications, Inc., of Baltimore, Mr. Wayne Schelle; from Dallas TX, Mr. Michael Roehrs; the Vice President of Advanced Technology Group of California, Dr. David Nagel, and the Deputy Director of the Florida Highway Patrol, Tallahassee, FL, Mr. John Carmody.

Gentlemen, I welcome all of you to the subcommittee and I thank you very much for your participation. May I first call on Chairman Schelle.

STATEMENT OF WAYNE SCHELLE, CHAIRMAN, AMERICAN PERSONAL COMMUNICATIONS, INC., BALTIMORE, MD

Mr. **SCHELLE**. Mr. Chairman, members of the committee, thank you for having us. My name is Wayne Schelle, and I am president of the company that took the cellular telephone system serving the Washington and Baltimore area from the experimental license stage to the first commercial system in the United States. Now we are actively developing a new technology, personal communication service, or PCS, that will be even more convenient, more versatile, and less expensive than cellular telephones.

A PCS telephone will be about the size and weight of a pocket calculator and should cost $75 to $100. I happen to have the very first one. And I am proud to say that this is a Motorola phone and it is American. It is a very convenient size and it will fit in pockets. It is going to do all kinds of various things for communications; bring it down to the public level, to the consumer level. I believe that this kind of instrument will serve perhaps 30 million Americans and perhaps 150 million people around the world.

It would be great for old technologies in Third World countries. It should be a $50 billion industry in 10 years after commercial licensing in which American companies and entrepreneurs hopefully can play a leading role, as we rightfully should.

We support S. 218, although PCS does not depend on the use of spectrum now allocated to the Government.

The reason I am here is not to support the bill but to vigorously oppose auctions and lotteries and offer what I hope are some ways to reform the present licensing process so that it will expedite new service to the consumer and better serve the public interest at large. The NTIA has proposed amending S. 218 to require the FCC to auction licenses to the highest bidder.

Let me explain why I think this is bad public policy. First, the highest bidder is not necessarily the best qualified to serve the public. What occurs you would move from the fast buck guy, as previously mentioned, to the big buck guy. All applicants are not equal in terms of engineering skills, operational marketing ability, financial resources, interest in customers. The Government tries to choose the best provider of communication systems for its military. There is every reason why we should do the same for PCS in each of its American cities and rural areas. All we want is to be judged on the basis of merit. We think we are good. We'd like to be able to be a licensee in various markets and serve our public.

Second, an auction system would encourage bids based upon excessive borrowing. We've had enough experience with highly leveraged broadcast and cable operators and businesses in other industries to realize that excessive leverage often leads to high rates, delays, poor service, and neglect; neglect on the public. Third, auctions would favor the Nation's largest companies.

Earlier when I testified in the House I said it would favor the Nation's Fortune 50. I am now not sure it would even reach to the 50. It would favor those companies over the smaller and I think everyone would agree the more entrepreneurial innovative more nimble smaller companies that have pioneered new technologies like personal computers and cellular telephones. Congress should not establish a system that would preclude these sorts of trailblazers from reaping the rewards of their risk and innovation.

Earlier in a testimony today McCaw was mentioned. McCaw is—I have nothing to do with McCaw. McCaw is the largest cellular provider in the United States. McCaw would not have participated in cellular had there been auctions.

Fourth, it is not fair to impose heavily spectrum costs on new services such as PCS and not on the more established services such as cellular and paying. This would handicap both competition and discourage new services.

Fifth, we doubt that auctions would yield the bonanza to the public treasury that some of the advocates predict. Cellular licenses are extremely valuable today, but remember that 10 years ago, 9 years ago when the first cellular licenses were awarded in the largest 30 markets, there were only 2 applicants in Chicago. I was there. I was here in Washington—applying for Washington, Baltimore and Tampa. There were only two applicants in Chicago. There were only two applicants in Boston. And only an average of four or five applicants in the first round of the largest American cities.

That is usually how it is when innovative but new and risky enterprises are just developing. It is easy to say—to look back and say, there will be enough financing in the auction process to finance operation Desert Storm, but in reality if you take a new technology at its immature birth rate, you probably wouldn't develop a billion dollars. That is usually how it is in most risky new enterprises.

The best way to maximize long-term Government revenues is to encourage new technologies, new services, and new competition. Not to rely on one-shot fundraisers such as spectrum auction.

One alternative which we think is a bad alternative is lotteries. We do not have to be binary. We do not have to be either auction or lotteries and nothing else, but the experience from cellular applications demonstrates that lotteries are inherently unable to select committed, well-qualified licensees who could quickly initiate service and expand it officially and aggressively. Once cellular became established the cellular lotteries drew hundreds of speculators per market speculators who were interested only in taking a chance on a Government giveaway.

We went to Washington, during the comparative hearing process and I appealed to Chairman Fowler not to go to lotteries saying a variety of abuses would occur. By the time qualified selectees were replaced in the lottery process speculators usually sold their licenses to companies who really wanted to build a system, and the speed that lottery had provided as a hope really died and took a lot longer to a point that many licenses are not yet on the air today.

The other method of licensing spectrum, the one that has been used at the FCC over 50 years in comparative hearings. It has a considerable advantage in identifying the most capable applicant on the basis of a variety of merits. And the one that is most likely to serve the public interest.

It also has the reputation for being slow and cumbersome. We think the process can be completely overhauled, can be expedited with the use of some outside professionals working with the FCC that will result in a much quicker process of a comparative hearing process that would also make the most meritorious applicant.

Two months ago we submitted the specific details of that proposal to the FCC and I included a summary of that in our written documents today. Let me say simply that the proposal entails substantial filing and substantial hearing fees that will reimburse the Government for the resources necessary to do what really should be done.

In conclusion, Mr. Chairman, members of the committee, we support S. 218, the reallocation of Government spectrum for private use. I urge the committee not to cripple the development of new communication technology by requiring that this spectrum be auctioned to the highest bidder. While spectrum is a natural—national asset, it converts to a public service, unlike grazing and oil and gas situations. And it certainly is not similar to operating a hamburger stand in Yosemite. Thank you.

[The prepared statement of Mr. Schelle follows:]

PREPARED STATEMENT OF MR. WAYNE SCHELLE

Good afternoon. My name is Wayne Schelle, and I am chairman of American Personal Communications (APC). As someone who has devoted many years to developing new communications technologies, I appreciate the opportunity to testify about the "Emerging Telecommunications Technologies Act of 1991." I was the first chairman of Cellular One—the company that took the cellular telephone system serving the Washington-Baltimore area from the experimental stage to the first commercial non-wireline system in the nation. We went on to build six more cellular systems across the country. We are now actively developing a new technology: Personal Communications Service—or "PCS"—that will be even more convenient, more versatile and less expensive than cellular telephones. PCS embraces a wide range of services from cordless and portable telephones to a system that transmits data and functions as a portable telecopier. A PCS telephone will have the weight and dimensions of a pocket calculator, except it will be thinner. It will cost $75, compared to $500 or more for today's cellular telephone, and calls will cost approximately 13 cents a minute, about one-third of the current cellular rate.

Although PCS does not depend on the use of any spectrum now assigned to the government, we fully support the aim of S. 218 to identify underutilized spectrum and make it available to the private sector. The growth of cellular telephones, and the development of PCS and other innovative services has increased demand for the electromagnetic spectrum. There seems to be a broad consensus that making spectrum available for implementation of new technologies can promote economic growth and improve international trade. The principal controversy appears to be just how this spectrum should be licensed. The three basic possibilities are auctions, lotteries and comparative hearings.

The National Telecommunications and Information Administration has proposed auctioning off licenses to the highest bidder. Let me explain why I think this is bad public policy: First, auctions make no effort to select the best qualified licensee. Launching a service like PCS in the most effective manner will require the highest degree of committed, capable and creative design and engineering skills and a high level of organizational capability to install and interconnect thousands of base stations in the largest markets and undertake the myriad other tasks necessary for a successful PCS operation. Implementing advanced PCS services such as high-speed data transmission and imaging will also require expertise, judgment and financial resources. We should not assume that all PCS applicants are capable of delivering similar quality product and service and that we can select among them based only on how high they bid at an auction.

Second, an auction system would encourage bids based on excessive borrowing. We have had enough experience with highly leveraged broadcast and cable operators to realize that excessive leverage often leads to high rates, poor service and delays in service expansion, service improvements and capital expenditures. Regardless of whether they were highly leveraged, PCS licensees launching their new businesses with the burden of having to "earn out of" very high auction payments would be slow to innovate, expand services, implement new technologies and compete domestically and internationally. These costs inevitably will be passed on to consumers.

Third, an auction licensing scheme would tend to restrict PCS operations to the nation's largest companies. Yet it is well-known that most of the growth in our economy over the past two decades has been generated by smaller, more adaptable, more entrepreneurial firms—the Silicon Valley enterprises that have their counterparts in the Dulles Airport corridor, Route 128 around Boston and outside other major cities. Similarly, in cellular telephone service smaller but substantial companies have often been the most aggressive in building their systems and bringing innovative services and technologies to the public. But they don't have the resources to bid for spectrum against the corporate giants of the Fortune 100. Congress should not establish an auction system that would preclude these sorts of trailblazers from participating in the new services they create and in reaping the rewards of their risk and innovation.

Fourth, it is neither fair nor consistent with public policy to impose the huge cost of spectrum auctions on one type of mobile/portable communications, such as PCS, while other partially overlapping mobile/portable services, such as conventional paging, cellular and SMR, would be wholly exempt from that financial burden. This discrepancy would severely and arbitrarily distort the market and discourage new competition and innovative services.

Fifth, we question whether auctions would yield the bonanza for the public treasury that some of its advocates predict. You cannot attribute the current value of successful cellular franchises to unproven new technologies and untested markets. Remember that the cellular franchises in Boston and Chicago originally attracted only two applicants each. Entrepreneurs are willing to take risks. But they are not going to pay premium prices for the right to implement new technologies that are far from a sure thing. The best way to maximize long-term government revenues is to encourage the strongest possible communications industry, not to rely on one-shot fundraisers such as spectrum auctions.

One alternative to auctions is lotteries. But the experience with cellular applications demonstrates that lotteries are inherently unable to select committed, well-qualified licensees who could quickly initiate service and expand it efficiently and aggressively. Once cellular became established the cellular lotteries drew hundreds of speculators per market who were only interested in taking a chance on a government giveaway. In the rural cellular lotteries, for example, it turned out that 25 percent of the tentative licensees were in violation of the FCC Rules and had to be disqualified. Let me emphasize: one in every four of the lottery winners couldn't even meet the basic requirements for claiming their license. The disqualifications and challenges to other selectees led to litigation and other delays. A large number of the other rural lottery winners sought to cash in by selling their construction permits before ever building a cellular system. This caused more delays until service was begun by the eventual purchaser. The very reason for using a lottery system was to expedite service. But the lotteries attracted so many speculators that the goal was frustrated.

The third method of licensing spectrum is the comparative hearing. The FCC has been using this method with considerable success for 50 years. It has the considerable advantage of identifying the most capable applicant and the one most likely to serve the public interest. The principal disadvantage has always been the lengthy hearing process and the absence of well-defined standards far evaluating applicants. The FCC has already begun developing ways to streamline this process for broadcast licenses. But much more needs to be done. APC has proposed several specific and aggressive steps the FCC should take to make comparative hearings a quick and efficient way to distribute licenses for services such as PCS.

The first step is to impose very substantial application fees. This will both discourage speculators and provide the resources for licensing and administering the new service. Second, the FCC should require applicants to submit specific and detailed information as part of their applications, and should establish in advance just how that information will be evaluated. The criteria should include engineering, operating and marketing plans, relevant skills and experience, and financial strength and commitment, plus a "pioneer's preference" for companies that develop new communications services. This will allow an objective numerical ranking of applicants before the hearing begins to give applicants a realistic assessment of their prospects. Parties with little chance of winning the license will probably drop out before incurring significant legal expenses. Other parties will be encouraged to settle, and settlement referees should be made available to facilitate the process. After the settlement stage, substantial hearing fees would be levied and applicants would be prohibited from accepting cash settlements to withdraw their applications. Finally, the hearing officer's (ALJ) decision would be appealable directly to the full Commission without an intermediate appeal to the FCC Review Board.

In implementing this plan, the FCC should make considerable use of outside experts, both to help design the standards for comparing applicants and to evaluate the actual applications. If necessary, ALJs could be borrowed from other agencies. The already overworked FCC staff cannot put aside its other responsibilities for an intensive project like launching a major new national communications service. The Commission needs some temporary reinforcements who have the skills and expertise for this particular task, and whose participation could be funded from the application and hearing fees. Expert advisory and assistance services of this sort are specifically authorized under the new Federal Acquisition Regulation.

These proposals would reduce the time for full hearings by 60 percent or more and would dramatically increase the number of full-market settlements that are concluded within four to six months of applications being filed. Most important, the applicants that come through this process will already have detailed and refined plans for their systems and confirmed financing arrangements. They will be ready to begin construction immediately.

In conclusion, Mr. Chairman, I support S. 218 and the reallocation of government spectrum to private use. But I urge the committee not to cripple the development of new communications echnologie5 by requiring that this spectrum be auctioned to the highest bidder.

Senator INOUYE. Thank you, very much. Mr. Roehrs.

STATEMENT OF MICHAEL ROEHRS, PRESIDENT, FIBERBOX, INC., DALLAS, TX

Mr. ROEHRS. Mr. Chairman, and members of the subcommittee, I am Michael Roehrs, president of the FiberBox, Inc., and I want to thank you for the opportunity to appear before you on S. 218, the Emerging Telecommunications Technologies Act of 1991.

I support this measure and commend you on its introduction. It is my hope that you will be able to move this legislation rapidly through Congress.

Without question the release of spectrum from the public to the private sector will greatly aid communications growth and investment as well as provide an opportunity for all entrepreneurs such as myself.

Again, my name is Michael Roehrs. I am an electrical engineer by profession and inventor and an entrepreneur. I have never testified before a Senate hearing before so I am not exactly familiar with some of the prior hearings that have taken place regarding the auction premises, but I am definitely opposed to an auction, which I will cover a little bit later.

I established a company last year to design, develop, and market communication systems. For the past 4 years I have been developing a mobile communications system. This system is currently patent pending and a patent should be granted later on this year. This system will put a mobile communications system device in the hands of every American. The system is called CELLCALL and it is a fully contained two-way communications system and operates between mobile-to-mobile stations—between mobile stations and fixed stations. The mobile unit looks and operates much like a cellular phone, and the base unit looks and functions much like a traditional telephone that is currently used in the home.

There are key differences between what this technology will offer and what exists today which make it valuable. First, there would never have been any charge for air time nor would there be any monthly service charge associated with the use of CELLCALL. As compared to cellular, the equipment costs generally are very inexpensive but they always get you on the back side regarding the monthly service charge and the permitted air charge. With CELLCALL you can buy a mobile unit and a base station and have everything you need. There are no exorbitant monthly service charges again because there is no direct telephone interconnect offered by the carrier service.

Second, what CELLCALL does is it eliminates the deficiencies associated with typical two-way radio. There will be no need to select a channel—frequency—adjust the squelch much and continually monitor the radio activity while waiting for a voice page. With CELLCALL the radio operates like a telephone. The end user dials a number for an outgoing call and hears a ring for an incoming call.

Third, the system is spectrum efficient in several different ways. First of all, it employs state-of-the-art technology which permits more users in a given amount of spectrum. And it automatically shares a plurality of channels among a plurality of users allowing an expediential loading factor permitting more people to utilize this network. Cellular employs the same technology.

Cellular has an established network where the cell tower controls the plurality of transceivers. What I have done is I have eliminated a need for a cell tower such that each radio functions autonomously as an independent local network.

CELLCALL transmissions are capable of traveling 15 to 20 miles without the need for towers to retransmit the signal. In addition, each CELLCALL radio functions—it also functions as its own independent local network determining which frequency and channel to send the call and/or receive a call.

In summary, CELLCALL is the right technology at the right time, providing the average person reliable mobile communications service without any charge and with the capability of interconnecting with the telephone network when necessary. There was an article in the Dallas Morning News concerning the system, CELLCALL system which I have brought with me, or a photocopy of it, which is entitled, "Entrepreneurs Are Seen as Key Strength of the U.S. Tech Industry."

First, they spelled my name wrong. Second, they did not have my company name in the article. And, third, they did not have our telephone number in the article. There was such an overwhelming response of people calling the Dallas Morning News, it was possibly the biggest response that department had ever seen. In approximately 5 hours after this article came out we would have sold as many as 8,000 units in the Dallas area alone. We've come to find out that the general public typically does 95 percent of their traveling within a 10- to 15-mile range of their home and generally the general public communicates with their home. With CELLCALL the general public then can call home directly without even interconnecting to a telephone line. And if it is required to connect through a telephone line. They are not required to pay the service charge or per minute charge associated with cellular. Another important feature of CELLCALL is going to be it is an emergency communication tool. The second most important thing for the motoring public is to have an emergency communication device. Statistics have shown that many of the CB's in the late 1980's were sold to women and general—and people in rural areas not as a communication tool, but as a emergency communication device in the event they were to have car trouble or have some other type of a emergency. Currently cellular is addressing this market and approximately 25 percent of the cellular phones are being sold to this market. With CELLCALL we address this market and we can provide the general public not only with cost effective, reliable communications that meet their needs and requirements, but also for their emergency communication requirements when they are outside the range of their home or office.

We have a great communications technology. For me to get this product to market I am going to need spectrum. This bill is very important to the future of CELLCALL and to its success, we do need the spectrum and we definitely support this bill for that purpose.

This bill is beginning to focus more and more on an auction and obviously I am definitely opposed to auctions, but I see other problems associated with technology, the FCC, and something that this bill completely omits, and that is through history we have allocated spectrum to certain entities to be used in many possible ways. Currently there is no initiative or nothing to drive these entities to utilize that spectrum more efficiently. In other words, they have the spectrum, they have a working system, let's not break it, why should we give up spectrum to implore a new technology. With CELLCALL, as an example, we could take a plurality of different entities, whether they are Federal or commercial entities, let them share a plurality of channels, thus freeing up additional spectrum for new technologies.

The same has to do with video. New technologies are being developed almost weekly concerning our ability to compress and send video through a smaller amount of spectrum. I highly urge that we not only look at auctions as a way of weeding out those who should have spectrum allocated to them, but take another look at how we can utilize the spectrum that is being used more effectively and efficiently. We need to put some type of an intensive into the current industry to make them want to make the investment in new equipment to utilize spectrum more efficiently.

This would have a couple effects. First of all, it would boost our technical output in the United States for new products that are being brought to market. Second, it would free up spectrum again for new and emerging technologies. One important thing about CELLCALL, it is not really governed by selling spectrum, it is governed more by rule, such as the CB market. A certain amount of spectrum should be set aside to be run by rule.

The system, in essence, operates itself and there is no need to license spectrum out to a cellular network to control this network and thus charge a monthly charge and a service fee associated with it. For this reason alone, I don't understand and cannot see how an auction system could work for CELLCALL. In the end, the use of auctions to award licenses make economic power the only criterion. This means the well off can win and win big. Entrepreneurs like myself won't have a chance. Chances are I am not going to make it. One out of every 10 new small businesses in the United States makes it, and without this bill and with auctions, I'm not even given a chance. I do not think that an auction would support the entrepreneurs across the United States, and this bill obviously is necessary to put new and emergent technologies on the market. Thank you.

[The prepared statement of Mr. Roehrs follows:]

PREPARED STATEMENT OF MR. MICHAEL ROEHRS

Mr. Chairman and Members of the Subcommittee, I am Michael Roehrs, President of FiberBox, and I want to thank you for the opportunity to appear before you on S. 218, the Emerging Telecommunications Technologies Act of 1991. I support this measure and commend you on its introduction. It is my hope that you will be able to move this legislation rapidly through the Congress. Without question, the release of spectrum from the public to the private sector will greatly aid communications growth and investment, as well as provide an opportunity for entrepreneurs such as myself.

BACKGROUND ON FIBERBOX AND THE CELLCALL SYSTEM

I am an electrical engineer, an inventor, and an entrepreneur. I am also the founder of FiberBox, a company I established last year to design, develop, and market communications systems and networks. For the past several years, I have been developing a new communications technology, CELLCALL, which has the potential to revolutionize the mobile communications industry. A patent for this new technology is now pending and is expected to be granted later this year. This new technology is the basis for a cost effective, affordable, reliable mobile communications system. It will put into the hands of the average American a mobile communications service with all the modern service features customers have come to expect from much more expensive services and equipment.

The CELLCALL system is a fully contained two-way communications system that operates between mobile stations or between a mobile station and a base (fixed) station. The mobile unit looks and operates much like a cellular telephone, and the base unit looks and functions much like a traditional telephone with the ability to reach both the mobile unit and telephone subscribers. There are, however key differences between what this new technology will offer and what exists today which make it so valuable.

First, there would never be charges for air time. In the cellular radio business today, it is not an exaggeration to say that the equipment is practically given away, while the monthly service charge is very expensive. With CELLCALL, you buy a mobile unit and a base station, and you have everything you need. There are no exorbitant monthly service charges because there are no service charges.

Second, it eliminates the deficiencies associated with a typical two-way radio. There will be no need to select a channel (frequency), adjust the squelch, and continuously monitor radio activity waiting for a voice page. With CELLCALL, the radio operates much like a normal telephone. The end user dials a number for an outgoing call and hears a ring for an incoming call.

Third, it is spectrum efficient in two ways: it employs state of the art transmission technology, permitting more users in a given amount of spectrum; and it automatically shares a plurality of channels among many users, allowing an exponential loading factor.

Finally, it does not require transmitter and receiver towers, as with cellular radio service, for frequency re-use and to operate the network. CELLCALL transmissions are capable of being sent over a 15-20 mile range without the need for towers to retransmit signals. (In the rare instance that the user is beyond this range, he could have the option of accessing another mobile radio network (and paying accompanying air time fees)). In addition, each CELLCALL radio functions as its own independent Local Area Network, determining on what channels calls should be sent and then 3finding where they are to be received.

In summary, CELLCALL is the right technology at the right time, providing to the average person reliable mobile communications service without any service charge and with the capability of interconnecting into the telephone network when necessary. It has the potential to bring mobile radio service to all Americans, not just the very few who can afford to use cellular radio service. Yet, there is a major problem—one that should come as no surprise to the authors of this legislation—there is insufficient spectrum where this system can be operated.

I have engineered CELLCALL to operate at the lower end of the spectrum range. The problem is that all of this spectrum is now occupied. While CELLCALL might be able to make a start in one of these lower end bands, this would not be enough to provide the public with the benefits of this new technology. While I can ask for more spectrum, it would have to be taken from spectrum already allocated to other services, a very difficult proposition. That is why we need the added spectrum promised by this legislation.

THE SHORTAGE OF SPECTRUM AND THE VALUE OF S. 218

Having a great communications technology and no spectrum is a little like having a great building and no land. You have no business. And just like with real estate, there are three keys: location, location, and location. The laws of physics and the cost of building equipment and offering a service are such that you want to put your technology in the prime spectrum—spectrum that would make CELLCALL possible and affordable. The FCC and the Executive Branch, however, allocated this spectrum a long time ago. There are no vacancies.

That means entrepreneurs and others with a new technology must take it away from existing commercial users. I know this Subcommittee is aware that these are the most ferocious fights at the FCC, because you are constantly being asked to choose up sides between an incumbent spectrum user and a newcomer. All it takes to win one of these fights is time, money, and luck. All of the things an entrepreneur has either in short supply or no control over.

While I recognize that the FCC allocation and licensing process is not the primary subject of today's hearing, your legislation takes important steps in the right direction by: 1. focusing attention on the problem; 2. requiring joint spectrum planning meetings between the Assistant Secretary of Commerce for Communications and Information. and the Chairman of the FCC; and 3. mandating that the FCC plan for the distribution of the reallocated spectrum. I especially want to commend the authors for telling the Commission that it should seek to give these reallocated frequencies to those proposing new services and technologies. That provision is fundamental to the United States maintaining its leadership in the communications industry. I urge the Subcommittee to build upon all of these provisions and to make needed changes to the spectrum allocation process for the private sector.

S. 218 clearly recognizes the need to reform the Commission's allocation process, yet it also understands that such reform will not occur in the short run. It therefore proposes another, more immediate approach to solving the dilemma of spectrum scarcity: reallocate spectrum from the public to the private sector. As I stated at the outset, I believe this approach will prove most productive.

In its hearing last year, this Subcommittee heard evidence from more than one witness demonstrating that much of the government's spectrum is used inefficiently or may even be lying fallow. I could make great use of that spectrum, as could many others—use that would translate into more innovative and cheaper services for the American public and into overall growth in the communications industry which would cement our world leadership. It is vital that this government spectrum be shifted as soon as possible.

The Subcommittee should view such a shift as the first installment on later transfers of spectrum. S. 218 implicitly recognizes that such a process has value because it requires that an advisory committee report on reforms in the process of allocating spectrum between federal and non-federal uses. I would urge that the Subcommittee consider taking this provision one step further and order that a new process be established where that the government's needs are constantly assessed with the objective of moving more spectrum to the private sector.

HOW SHOULD THIS NEW SPECTRUM BE ALLOCATED

As I stated earlier, I believe there are numerous problems with the FCC's current process of allocating spectrum and awarding licenses. I would like to work with the Subcommittee on a better process. On the other hand, the auction scheme proposed today is not the one we should settle on. It would be the death knell for myself and other entrepreneurs, and in turn, it would harm the overall United States effort to maintain technological leadership in communications.

It is vital to the dealing with the auction proposal to understand that it gives one, all encompassing answer to several very different problems—problems that have different and better answers if they were answered separately. The first problem addressed by the auction proposal is that the government has not directly captured for its own monetary benefit the economic value of the spectrum it gives commercial users. Today, this value is usually captured by the licensees. I recognize that many incumbent licensees believe they, in effect, are paying for spectrum through the public interest duties they perform. That may be so, but if you look deeply at communications license transactions, it is evident that a large percentage of the price paid for a communications property is for some sort of exclusivity—or rather the value of the spectrum.

I do not have a problem with paying for a resource fundamental to my business. I am not asking for a free ride. I, however, have a great problem with paying through an auction. It simply gives an overwhelming advantage to incumbent licensees who have not paid such a fee and who I have to compete with or to those who have deep pockets and little else. Entrepreneurs, almost by definition, are short on funds. If we are required to pay up front, we are at an inherent disadvantage. If we are required to pay and our competitors are not, we are at a disadvantage. I would much prefer to pay through a process considered by this Subcommittee some time ago: a license transfer fee. That is when people generally make money and have the ability to pay. Such a process would enable an entrepreneur to play on a more level field.

I should mention one other point about the use of an auction to capture the value of the spectrum. The CELLCALL system is designed to be a service that operates by FCC rule, but it does not require that a license be awarded. That is how CB radio works today. I find it difficult to envision how this technology could operate in the world of auctions of spectrum or auctions of licenses. Auctions seems to presume some well-defined operator community that can make an economic judgment on what to bid based on what could be resold. But with CELLCALL, every individual is an operator, and it is unrealistic for tens of thousands of users to bid for licenses—if licenses existed at all. Who then would bid? The equipment vendor might but only for an allocation of spectrum not for the award of licenses. What's more, what equipment vendor would bid: the initial entrant or latecomers? In the end, the auction process makes a very poor fit with the proposed CELLCALL service.

A second problem the auction proposal seeks to address is to make spectrum use more efficient. In other words, if you pay for something, you will make sure you use it in the best way possible. This too is a worthy objective, and it would likely cause spectrum to be freed up for new uses. However, again you need not adopt an auction scheme to achieve this goal. The license transfer fee I proposed earlier or some other rental type fee would also do the job. Moreover, the specific auction of licenses scheme now proposed would hardly achieve that goal since current spectrum users, who use most of the spectrum—would not be included.

Finally, the auction proposal seeks to achieve something that has nothing to do with enhancing the government's revenues or making spectrum use more efficient. It seeks to be a better way to award licenses, that is choose the licensee who would best serve the public interest. The presumption is that the current methods have not worked well, and it is hard to quarrel with such a conclusion. There is little doubt that the comparative hearing process is cumbersome and time consuming. There is little doubt that the lottery process has been fraught with abuses. Yet, would auctions be any better? If you had lots of money, it sure would be. But, would it award licenses to operators who would better serve the public interest? Almost certainly not. The auction process makes the public interest synonymous solely with an operator's commercial interest. I believe this to be contrary to the spirit of the 1934 Communications Act. In addition, it is likely in an auction that there would be a difference inability to serve the public between the top bidder and those who followed close behind. In reality, a key to serving the public interest is having some minimal financial wherewithal—a qualification the Commission has shied away from rigorously enforcing in the past decade.

In the end, the use of auctions to award licenses makes economic power the only criterion. This means the well-off can win, and win big. In exchange for this, all that is promised (in terms of better licensing) is some increased speed in awarding licenses. As a entrepreneur, this is a trade-off I cannot find acceptable.

The adoption of an auction scheme thus has far-reaching effects that, in my opinion, do not serve entrepreneurs and many other groups and individuals that do not have deep pockets. I believe this Subcommittee is well aware of the benefits these groups and individuals have brought to the communications industry over the years, in service, in the development of technologies, and in economic growth. It is already hard enough for an entrepreneur to enter the communications business. An auction scheme is not just one more hurdle—because it is a hurdle that will be virtually impossible to surmount. If the Subcommittee is concerned about the government getting its value from the spectrum and about creating more efficient use of spectrum, there are other, less harmful ways of reaching these goals.

CONCLUSION

The communications industry is one of the shining lights of American technical skill and know-how. We are truly leaders in the world, but we are in jeopardy of losing that lead if we do not allow new technologies and services to be brought to market. A major impediment here is the lack of spectrum and the required time, energy, and resources that must be expended to obtain the necessary spectrum. The government needs to address these very difficult and important problems. S. 218 is an excellent first step in the right direction. I wholeheartedly endorse it, and I will assist you in any way to enact it into law. Thank you.

Senator INOUYE. Thank you, Mr. Roehrs. Dr. Nagel.

STATEMENT OF DR. DAVID NAGEL, VICE PRESIDENT, ADVANCED TECHNOLOGY GROUP, APPLE COMPUTER, CUPERTINO, CA

Dr. NAGEL. Thank you, Mr. Chairman. My name is David Nagel. I am vice-president for Advanced Technology for Apple Computer. We are very happy and pleased to be here today to talk about the reallocation of spectrum for what we think is a very important purpose, and like some of the other witnesses, I have formal written testimony that I be asked to be submitted to the formal hearing.

Apple Computer supports the enactment of S. 218 to provide frequencies for new technologies. Apple recently has proposed to the FCC that the Commission allocate frequencies, in our case 40 megahertz, between 1850 and 1990 megahertz for a new wireless communication system for data communication. We call this technology data PCS. Data PCS will permit high capacity, and I think the key term is "high capacity," communications between and among people using personal computers. It will be new kind of network in a local area, perhaps 150 radius. It will be open to any computer manufacturers' products and any network access and usage scheme that complies with the regulatory requirements.

The urgent need for data PCS derives from what we see as three very fast moving trends. The first of these is affordability of personal computers. Most observers predict a growth rate of 40 to 60 percent per year until they represent at least one-third of U.S. computer sales by 1993. Already 43 percent of personal computers sold in Japan are laptops, and actually in the New York Times today that figure was reported at 50 percent, but it is a figure that is expected to grow to at least 60 percent within 2 years.

A second major trend is the growth of network PC. More than 70 percent of McIntosh computers, for example, are connected to communications network. Recent U.S. census figures show that approximately 25 percent of all personal computers in the home have modems that connect to the telephone network. Soon the term stand-alone computer will be an obscene moron, if it is not already.

The third major trend is now the most significant bottle neck in advanced computer technology, which involves the interaction, as Senator Pressler indicated initially in his remarks, the interaction of images and sound. This so-called multimedia, data rich computing, will soon be an everyday requirement for people using PC's.

If the chairman would permit, I have a brief videotape that illustrates our vision of what Senator Pressler called telecomputers and what these might be, what these might be in future and the benefits they might provide, about a 4-minute video.

Senator INOUYE. Please proceed.

[A brief video presentation was given.]

Dr. NAGEL. Thank you, Mr. Chairman. Unfortunately I am not making a product announcement today, but I can tell you that most, if not all, of the technologies that are required to make the computers in those three short video clips a reality. What's not available are the frequencies that we've asked for in our petition to the FCC. data PCS requires new frequency. Part of the reason is that the kind of data exchange requirements that these sorts of systems impose cannot be made with voice rate or modem rate communication systems. The problem is that many other worthy technologies also require spectrum, why should data PCS get frequency while other new technologies do not? S. 218 relative worth analysis answers this question, we believe admirably.

New technologies should have access to frequency if they score high on a three-part test. First, is it a unique technology that would not exist but for those new frequency. Second, will the technology increase the productivity efficiency of the U.S. public and private sectors, and, third, will devoting spectrum of the technology foster U.S. competitiveness in U.S. markets.

We believe the data PCS scores high on this test in all counts. As far as innovations concerning data PCS is unique. Unlike other services in computer technology, for spectrum it is not a way to provide a system better or cheaper.

The second issue is productivity. data PCS contributes to productivity in virtually every segment of society. Productivity is increased when accessed information, both qualitatively and quantitatively. Quality is up on resources inside the classroom to stimulate students with the what if questions that are really the essence of learning. Coworkers who can collaborate on reports and projects, whole screens of text and images, are more productive workers. Productivity gains, we believe, are inevitable when we bring the power of computing into the classroom or the workplace.

It was recently signalled out by Advanced Technologies as increasingly critical to U.S. competitiveness. I would note that IBM, for example, recently announced its newest computer in Japan not in the United States and in fact will sell it in Japan first and it will build all future portables in Japan.

The NEC Corp. recently announced a wireless data PCS like system, it is a lower performance, but a data PCS like system in Japan using an existing—using a new extension to the Japanese telecommunications system. U.S. leadership and information technologies, however, cannot be maintained if we stand still in the area of spectrum allocations. We are being increasingly challenged by foreign customer, notably Japan, but others as well and particularly in the fast growing computer market segment. Other countries like Japanese are preparing for the International Telecommunications Union's 1992 World Administrative Radio Conference in 1992, also known as Work 92, by providing plans for a frequency of variety of personal communication service.

Let me turn now to marketplace mechanisms. There has been continuing debate, and we heard more ideas on this debate today, on the usefulness of marketplace mechanisms that frequency assignment tool. Apple believes in certain contents ample auction or competitive bidding may have its use and may work. This tool, however, is not needed in data PCS. The Government can derive revenue from data PCS by requiring come manufacturers and vendors to collect license fees from users and pass them on to the Treasury. The state-of-the-art spectrum efficiency is ensured by data PCS and by the regulatory requirements that will characterize this authorization.

In conclusion, Apple is another in the computer industry, and I might add we have had very strong support from other members in the industry, including IBM, NCR, but other members strongly support the goal of S. 218, which is to reallocate additional radio spectrum to ensure the United States fully invest in an economical future providing world growth and world leadership. We have, however, a great sense of urgency providing a need for the passage of this legislation. This will be the beginning of a very lengthy process to identify frequencies for reallocation. This process must begin now, and I would just say in closing and parenthetically, in our industry 6 months is a long time—12 months the whole industry can really undergo major change and three product cycles can go by in a short period of 18 months and if a given manufacture misses in any significant way those three product cycles, they simply are not competitive in our industry. Thank you very much.

[The prepared statement of Dr. Nagel follows:]

PREPARED STATEMENT OF DR. DAVID NAGEL

Mr. Chairman and Members of this subcommittee, I am David Nagel, the Vice-President for Advanced Technology of Apple Computer, Inc. I appreciate the opportunity to appear before this subcommittee regarding S. 218. Apple Computer shares your belief that the future of the United States' telecommunications and information industries is tied to the availability of adequate radio spectrum for new technologies.

OUR PURPOSE IN TESTIFYING

Our primary interest in testifying before you today is to support your initiative to secure adequate radio spectrum for new technologies. Apple recently petitioned the FCC to allocate frequencies for a new wireless personal communications technology for data communications. We call this new technology "Data-PCS." It will permit high-capacity computer information to be communicated between and among people using personal computers.

Data-PCS will make possible instantaneous sharing of information throughout a local radius of perhaps 150 feet inside buildings. This represents the area where learning takes place in classrooms,. where business is done, and where people interact with each other in professional settings. Data-PCS uses extremely low-power radios that convey information in brief "packets" only fractions of a second long and those radios require an allocation of spectrum.

Apple's Petition to the FCC seeks an allocation of 40 MHz between 1850 MHz and 1990 MHz—for this new technology. As conceived by Apple, a Data-PCS radio service would:

- be accessible to users of personal computers without imposition of licensing obligations, network connection fees, or air-time charges;
- be open to any computer manufacturer's products and any network access and usage scheme that complies with the regulatory requirements;
- be regulated in a manner that assures non-discriminatory access to the assigned spectrum by compatible devices that are used for like purposes; and
- have flexibility built into the initial regulatory scheme to encourage innovation in and the evolution of Data-PCS technologies and services.

THE URGENT NEED FOR DATA-PCS

The urgent need for Data-PCS results from three fast-moving trends in information technology:

1. The portability of personal computers. Laptop and smaller personal computers are now the fastest-growing segment of the market. This "laptop boom," as Business Week proclaimed it on the cover of the issue of March 18, has major implications not only for how existing users take advantage of their computers, but also for making computers more accessible to average Americans—even, in Business Week's words, to "die-hard technophobes."

Most observers predict a growth rate of 40 to 60 percent per year for portable computers until they represent at least one-third of U.S. personal computer sales by 1993. Already, 43 percent of the personal computers sold in Japan are laptops, a figure that is expected to grow to 60 percent within two years. I might add that the worldwide portable computer market segment is increasingly dominated by our Japanese competitors, but innovations such as Data-PCS could stay—or even reverse—the trend.

2. The growth of networked PCs. More than 70 percent of Macintosh computers, for example, are connected to communications networks. Recent U.S. census figures show that, at present, approximately 25 percent of personal computers in the home have modems that connect to telephone lines. Communications capabilities are rapidly becoming one of the reasons that people find PC's of enormous value. Soon the term "stand-alone" computer will be an oxymoron.

3. The demands for greater bandwidth. The vastly increased abilities of computers to manipulate information of all types, require communications networks that have greater bandwidth and, therefore, that are capable of higher speeds. More bandwidth is needed to move qualitatively different kinds of information—particularly images and, soon, moving images. This so-called multimedia computing will soon be an everyday requirement for people using personal computers.

THREE-PART TEST FOR S. 218

This need for wireless, local-area networking cannot be met with existing technologies or frequency assignments. Data-PCS requires new frequencies. But the problem is that many other worthy new technologies also require spectrum. Why should Data-PCS get frequencies, while other new technologies do not? Applying S. 218's "relative worth" analysis to Data-PCS provides a clear-cut answer to this question. New technologies should have access to frequencies if they score high on a three-part test:

- Is it a unique technology that would not exist but for those new frequencies?
- Will the technology increase the productivity and efficiency of the United States public and private sectors? and
- Will devoting spectrum to this technology foster U.S. competitiveness in world markets?

Data-PCS scores high on this test on all counts.

INNOVATION

Data-PCS is unique. Unlike other services and technologies competing for spectrum, Data-PCS is not simply a way to provide an existing service better or cheaper; it does not exist now, despite the need for it, because it can be provided only over wireless links and there are no appropriate frequencies that can be used for this purpose.

Combined with the test for innovation called for by the legislation, S. 218 should impose a "but for" test: that is, "but for" use of the radio spectrum, would this technology be possible? Are there alternate means, particularly non-spectrum dependent means, to provide the same service? And are there alternative frequency allocations, already made, that can be used for this service? Here too, Data-PCS passes the test.

Given the requirement for portability and mobility of the communications networks that must serve laptop and notebook-sized PC's, Apple concluded that use of wired and infrared local area networks ,valuable as they are, was not feasible for Data-PCS.

There are at the present time no regulatory-permitted technologies and no radio services that can be used to create the shared electronic space necessary for collaborative computing. No existing technology or service, whether cellular telephone networks, SMR-based mobile data networks, or the newly-proposed voice personal communications services, can assure consistent, high-quality, high-capacity Data-PCS in a spectrum-efficient manner.

Apple also investigated frequencies that are already allocated to see if they could be adapted to Data-PCS use. Such frequencies in the 18 GHz and higher range do not provide the coverage, range, or mobile connectivity necessary to make Data-PCS effective. Similarly, the already allocated Industrial, Scientific, and Medical ("ISM") radio bands are inadequate for Data-PCS, because of the strong likelihood of unpredictable, and essentially uncontrollable, interference from a wide variety of radio devices (including devices not used for communications) that are permitted to transmit energy in the ISM bands. These devices are more powerful than Data-PCS transmitters would be and have operating characteristics and bandwidth needs vastly different from and incompatible with those of Data-PCS.

PRODUCTIVITY

The linkage between computers and communications long has been known as means of enhancing productivity. In virtually every segment of American society, productivity is increased when access to information—both quantitatively and qualitatively—is increased.

Most recently, the Report of the President's Office of Science and Technology, called "High Performance Computing and Communications," pointed out the importance of high capacity computing and communications to a wide segment of American society, particularly education, science, and industry. It eloquently portrays the value of modern computer and communication technology, because that technology "contributes to more effective approaches to problem solving, new products and services, and enhanced national competitiveness across broad sectors of the economy.

While the President's Report focuses on the "superhighway" of high performance computing and communications, the same productivity gains result from putting into place Data-PCS, which are the "city streets" of computing and communications. Both the city streets and the superhighway are essential to our productivity as a nation.

Imagine the gains in productivity and efficiency in all walks of life, if we can bring the power of computing into people's personal space any time, any place. For example:

- among teachers and students in a classroom, or even to access resources in the library;
- among a group of people working together on a report;
- between a doctor and her file of x-rays; or
- from a scientist to the "bead" of a national network that connects him to acquired knowledge residing at research institutions throughout the nation.

The advantages of Data-PCS to education, which has long been a prime commitment of Apple's, are profound. Teachers operating within the confines of a structured classroom may not be always as effective as teachers who instantly can draw upon resources outside the classroom to stimulate students with the "what if" questions that are the essence of learning. Wireless networks also will enable teachers to rearrange students among reading, math, and writing groups, for example, for the benefits of "situation-driven" learning experiences. Data-PCS will eliminate the need for hardwiring among computers and the associated barriers of both time and funds.

INTERNATIONAL COMPETITIVENESS

S. 218 contains the finding that the availability of frequencies for certain uses affects the international competitiveness of the United States' economy and requires the consideration of "the activities of foreign governments in making spectrum available for experimentation on commercial components in order to support their domestic manufacturers of equipment." This is a key criterion, and the U.S. regulatory environment must allow and encourage Data-PCS.

Information and communications technology has long been the United States' competitive edge in world markets. Worldwide, the personal computer industry still has a strongly American flavor. According to the Electronic Industries Association, the U.S. trade deficit in electronic products, even suffering the near-loss of our consumer electronics industry, was reported to have been cut in half in 1990, with much of the improvement coming from sales abroad of U.S. computers.

The President's Council on Competitiveness recently singled out information technologies as "increasingly critical to [U.S.] competitiveness," with particular relevance to "the growing service sectors of the economy." The report further notes, however, that this an area in which foreign competitors are challenging U.S. leadership, and that "portable telecommunications equipment, combined with appropriate computer architecture, could be critical to maintaining "U.S. strengths in information technologies." No better embodiment of such a combination than Data-PCS can be visualized.

U.S. leadership, however, cannot be maintained if we stand still in the area of spectrum allocations. We are being challenged by foreign countries, and particularly in the fast-growing portable computer market segment. The Japanese have not ignored the potential of laptops or the potential for integrating these computers with wireless solutions. Just last month, according to The New York Times, NEC Corporation announced "a lightweight portable computer [that NEC] said was the first able to communicate with other computers without a telephone line." The service to be provided within Japan does not yet approach our vision for Data-PCS, but the message underlying NEC's development is clear: if U.S. industry is to avoid being left behind in this critical area of wireless computer communications, we must begin now to develop appropriate products. We cannot do so, however, unless our Government is willing to allocate frequencies, as an urgent priority.

Some governments provide direct cash support for their high-tech industries. It was recently reported in the Financial Times that France has committed over $1 billion in new subsidies to its electronic industry, and is calling on stronger NEC policies to counter U.S. and Japanese competition. Other countries, including the Japanese, are preparing for the World Administrative Radio Conference in 1992 ("WARC-92") by developing plans for extensive frequency allocations for a wide variety of personal communications services. But, so far, no country outside the U.S. has taken direct action to enable a service resembling Data-PCS. Apple has proposed such action for the U.S., as well as U.S. support at WARC-92 so that global allocations can foster the proliferation of Data-PCS in a U.S. image.

If we can accomplish this, we will have a lot to say about the software, protocols, and standards for the communications capabilities of personal computers. Unlike the case with too many new technologies, the United States can set the de facto worldwide standard for Data-PCS, but only if we act now.

AUCTIONS/USER FEES

Apple is encouraged by the focus on the spectrum needs of new technologies that is contained in the recent NTIA Spectrum Report and the Administration spectrum bill. We have reviewed the principal features of the NTIA report and the Administration's bill. We believe that the improvements in federal spectrum management that will result when the recommendations of the Report are adopted, and the increased coordination of spectrum planning between the FCC and NTIA, will lead to more efficient spectrum use generally and will ease the way for a varied array of new technologies that otherwise would not come to pass without the additional frequencies that will be freed by the combined efforts of the FCC and NTIA.

The public debate engendered by S. 218, the NTIA report, and the Administration bill also has focussed attention on mechanisms for selling, leasing or taxing the use of the radio spectrum in order to raise revenues for the federal government and to substitute marketplace incentives for regulation as a means to assure more efficient spectrum usage. The Administration and the FCC, for example, have gone on record as supporting competitive bidding as such a mechanism for frequency assignments or licensing.

Apple believes that marketplace mechanisms, including competitive bidding, in certain circumstances should be authorized as one of the FCC's and NTIA's spectrum management tools. This tool, however, is not needed in Data-PCS. We certainly want to assure the highest level of efficiency in the use of Data-PCS. Our proposal to the FCC stresses spectrum efficiency as one of the principal objectives of creating a digital, packet radio transmission medium for local area wireless communications. Once spectrum efficiency is assured, Data-PCS will succeed only as an open resource—open to any manufacturer and any user—which no service provider or network operator controls. Individual users must have free and unconstrained access to the allocated frequencies to meet their communications needs without licensing delays, without service or airtime charges, and without having to bid against other users for the privilege of becoming more productive and efficient, using Data-PCS.

Apple, moreover, does not have any quarrel with the government's deriving more revenues from the use of the spectrum allocated for Data-PCS. Even without requiring radio licenses for individual users of Data-PCS-equipped PC's, fees could be collected from Data-PCS users much as software license fees are collected. That is, computer manufacturers and vendors could collect spectrum license fees from users and pass them on to the Treasury.

CONCLUSION

S. 218 would reallocate additional radio spectrum to ensure that the United States fully invests in its technological future, providing economic growth and world leadership in this area. Apple and others in the computer industry strongly support that goal—it is also our goal in proposing an adequate frequency allocation for Data-PCS. But, Mr. Chairman, time is of the essence. WARC92, emerging computer technologies, offshore competition and user requirements will not wait.

We must speed up the process of identifying the frequencies to be reallocated from the federal government. We must speed up the process of allocating and assigning those frequencies once they are under the aegis of the FCC. In this worthy effort, you, the Administration, NTIA, and the FCC have Apple's pledge of assistance. Thank you.

Senator INOUYE. Thank you, Dr. Nagel. And now may I call on Director Carmody.

STATEMENT OF JOHN W. CARMODY, DEPUTY DIRECTOR, FLORIDA HIGHWAY PATROL, TALLAHASSEE, FL

Mr. CARMODY. Thank you, Mr. Chairman, for the opportunity to testify today on behalf of the public safety community of this Nation.

Mr. Chairman, I am appearing today as a member of the Associated Public-Safety Communications Officers, APCO, and of the International Association of Chiefs of Police, IACP, to support the S. 218, the Emerging Telecommunications Technology Act of 1991. I am also chairman of the Florida Joint Task Force on State Law Enforcement Communications.

As a member of APCO I'm speaking not only for the law enforcement community but also the firefighting community, emergency medical services community, and all the other State and local government operations that provided assistance to citizens in the country when their lives or property are in peril. I am a member of the communications committee of IAPC, I also have brief statements from Ithaca, NY, Police Chief Harlin McEwen and Kansas City, MO, Police Chief Steven Bishop to submit for the record and respectfully ask your permission to do so.

Senator INOUYE. Without objection.

Mr. CARMODY. Chief McEwen is chairman of the Communications Committee of the IACP and Chief Bishop is a spokesman for the Major Cities Police Chief Association on communications matters. I am here today because State and local governments of the United States need your help. Some of us need your immediate help to cure a present deficiency of spectrum which is keeping us from implementing the modern communication systems we need today, and all of us need your help to make sure there are spectrum provisions to let us take advantage of the high-tech features that will be here in the future.

S. 218 speaks to emerging technologies. We have seen glimpse of what is in store for public safety and we'll need them. Some are right around the corner and others are a little further down the road.

Our most urgent immediate need is in the largest metropolitan areas of the country. Concentrations of people translate directly into spectrum requirements to keep our society served and under control. In the case of my own agency, and other public safety agencies serving the area, we do not have enough spectrum for today's requirements in the southern Florida megopolis.

Other public safety witnesses who appeared in support of this and similar legislation in both the Senate and House this year and last have testified as to the critical spectrum shortfalls in the Greater New York metropolitan area, the Chicago metropolitan area, and the Southern California area. These areas are out of spectrum now and others are not far behind. Name almost any of the 10 larger major metropolitan areas and you have an area with public safety communication problem at hand or soon to come.

Amended from its original version last year to make sure public safety needs will be addressed, as this committee chairman has pointed out in the introduction of S. 218, this bill will help. All of the organizations I represent strongly support S. 218 in that light and appreciate the efforts of this committee. S. 218 is a good start. Alone, however, it will not provide what is necessary for the future.

We recently saw with striking clarity what the absence of adequate communications can do in a tactical situation as we first destroyed Saddam Hussein's communication capabilities and then routed his forces in the Persian Gulf. It is no exaggeration to say that the sheer burden of work is seriously straining the communications capability of many of our public safety agencies in metropolitan areas.

During hearings on S. 2904 last year there was talk of a peace dividend in spectrum. In discussing a reduction in the military forces and why the Federal Government may not need all the spectrum currently under its administration. State and local governments of this country must point out now, as we did last year, that there continues a very strong escalation of the direct warfare which is being waged by and with the criminal elements within the United States. There is no such peace dividend at hand for States and local government and no reduction in spectrum requirements.

I would like to make one point very clear from our perspective. The organizations I represent do not seek to reallocate spectrum, which may really be needed by the Federal Government agencies for their public safety, National defense or security operations. We recognize that under the communications act we come second to those requirements. The spectrum recognition we seek, however, is directly behind those requirements and ahead of any other uses of the spectrum.

The public safety community has no quarrel with the intent of S. 218 to make room in the spectrum for new commercial opportunities. We firmly applaud that intent of the bill and will no doubt make good use of the new commercial services which will evolve. There must be the recognition, however, that satisfying the public safety needs of our citizens is of higher priority in allocations than any commercial exploitation of the spectrum. The Congress has recognized this in past legislation in the early 1980's directing the FCC to satisfy those needs. The legislation should have taken care of the public safety problems as seen at that time. But its implementation has fallen short in the major metropolitan areas.

In response to the 1983 congressional actions, the Commission released a notice of inquiry in the matter of public safety telecommunications requirements. The stated purpose of that proceeding was to solicit public comments to enable the Commission to develop a plan that ensures the present future requirements of State and local governments of public safety authorities are accommodated in allocation of the electromagnetic spectrum.

The Commission sought information on current problems with existing systems, anticipated growth, new applications, and new operational configurations. The Commission got the information it sought and its private radio bureau released a comprehensive report setting forth public safety's future requirements. That report must not be allowed to stay buried in the agency's files.

APCO submitted comments in response to that inquiry stating the principal issue is making adequate spectrum available for public safety operations. It pointed out that action must be taken to, first, alleviate current spectrum shortages; second, enhance the capability of interagency communications in emergency disaster situations through networking and other techniques; and third, ensure the availability of adequate spectrum to meet future needs both short range, 3 to 10 years, and long range, 10 to 25 years. That is still the action which must be taken.

My prepared statement goes into considerable amount of detail about the south Florida area. With spectrum demands escalating to the degree where Congress is very properly expressing its concern as evidenced in S. 218 and with the FCC inquiry into future public safety spectrum requirements, evidently it is imperative that the public safety community step forward in this forum.

The attached appendix provides an analysis for these spectrum needs for a major urban area, Los Angeles in this analysis, but it would apply to any major metropolitan area. And it indicates that public safety will require a long-term allocation of 100 to 150 megahertz if it is to meet the unique and specific requirements of public safety operations. If the U.S. public safety community is to continue in its leadership role in the application of new and effective communications technologies, Congress and the FCC must now clearly identify its spectrum needs and take action to satisfy them.

In summary, the major urban areas of the United States are or will shortly be entirely out of spectrum to modernize and expand their public safety systems and/or implement new systems with today's state-of-the-art technology. There are up to a dozen areas that require immediate or near-term, 3- to 5-year, relief. New York, Los Angeles, Chicago, southern Florida, Dallas-Fort Worth, and possibly other metropolitan areas are in this situation. More rural areas of the country such Alaska, Montana, Wyoming, Idaho, and other sparsely populated areas have enough public safety spectrum for the immediate future, but no area of the country has public safety spectrum adequate to accommodate the emerging technologies coming for our use.

In satisfying public safety's requirements for mobile communication systems, the huge investment of State and local governments in point-to-point microwave systems must not be destroyed. Thank you, Mr. Chairman.

[The prepared statement of Mr. Carmody follows:]

PREPARED STATEMENT OF MR. JOHN CARMODY

Mr. Chairman, I am appearing here today as a member of the Associated Public-Safety Communications Officers (APCO) and of the International Association of Chiefs of Police (IACP) to support and urge adoption of S. 218, the "Emerging telecommunications Technologies Act of 1991".

I am Chairman of the Florida Joint Task Force on State Law Enforcement Communications.

As a member of APCO, I am speaking not only for the law enforcement community, but also for the firefighting community, the emergency medical services community, and all of the other State and Local Government operations that provide assistance to the citizens of the country when their lives or property are in peril.

I am also a member of the Communications Committee of IACP. I also have brief statements from Ithaca, New York, Police Chief Harlin McEwen and Kansas City, Missouri, Police Chief Steven Bishop to submit for the record, and respectfully ask your permission to do so. Chief McEwen is Chairman of the Communications Committee of the IACP, and Chief Bishop is a spokesman for the Major Cities Police Chiefs Association on communications matters.

I am here today because the State and Local Governments of the United States need your help.

Some of us need your immediate help to cure a present deficiency of spectrum which is keeping us from implementing the modern communications systems we need today, and all of us need your help to make sure there are spectrum provisions to let us take advantage of the high tech features that will be here in the future.

S. 218 speaks to emerging technologies. We have seen glimpses of what is in store for the public safety community and we will need them. Some are right around the corner; some a little further down the road. An appendix to my statement outlines some of our future requirements.

Our most urgent immediate need is in the largest metropolitan areas of the country. Concentrations of people translate directly into spectrum requirements to keep our society served and under control. In the case of my own agency and the other public safety agencies serving the area, we do not have enough spectrum for today's requirements in the Southern Florida megopolis.

Other public safety witnesses who have appeared in support of this and similar legislation in both the Senate and the House this year and last have testified as to critical spectrum shortfalls in the Greater New York Metropolitan Area, in the Chicago Metropolitan Area, and in the Southern California Area.

These areas are out of spectrum now, and others are not far behind. Name almost any of the top dozen major metropolitan areas and you have named an area with a public safety communications problem at hand or soon to come.

As amended from its original version last year to make sure public safety needs will be addressed, as this Committee Chairman has pointed out in the introduction of S. 218, this bill will help cure the desperate plight of the public safety community. All of the organizations I represent strongly support S. 218 in that light, and appreciate the efforts of this Committee and its counterpart in the House of Representatives to that end. S. 218 is a good start. Alone, however, it will not provide what is necessary for the future.

Other than possibly the Federal Government operations which tend to our National Defense, there can be no higher priority claimants for adequate radio frequency assignments than the agencies and departments in our State Governments and our Local Governments who are by law charged with the safety and well-being of our citizens.

We recently saw with striking clarity what the absence of adequate communications can do in a tactical situation, as we destroyed Saddam Hussein's communications capability and routed his forces in the Persian Gulf. It is no exaggeration to say that the sheer burden of work is seriously straining the communications capability of many of our public safety agencies in metropolitan areas.

During hearings on S. 2904 last year, there was talk of a "peace dividend" in spectrum, in discussing a reduction in military forces and why the Federal government may not need all of the spectrum currently under its administration. The state and local governments of this country must point out now, as we did last year, that there continues a very strong escalation of the direct "warfare" which is being waged by and with the criminal elements within the United States. There is no such peace dividend at hand for the states and local governments, and no reduction in spectrum requirements.

I would like to make one point very clear from our perspective. The organizations I represent do not seek to reallocate even the smallest bit of spectrum which may be really needed by the Federal government agencies for their public safety or national defense operations. We recognize that under the Communications Act, we come second to those requirements. The spectrum recognition we seek, however, is directly behind those requirements and of other uses of the spectrum.

You and I would regard as unthinkable a failure to make sure that the Federal Aviation Administration had enough radio space for its use in keeping our civil aviation operations as safe as possible. The people of our Local Governments who must operate the highway systems of our country are every bit as critical as the air traffic control people, yet are sometimes denied spectrum to help them do their jobs.

That's only one example. There are many.

As critical as the Federal energy and water operations are, and justly deserving of spectrum priority, so are the many departments at the State and Local Government levels which are responsible for actually delivering energy, water and other life-sustaining products to the public.

The US Forest Service certainly should have enough spectrum for communications systems to cope with the disastrous forest fires we experience, but so should the State and Local Governments which more often than not have to do the same job on their own, or stand shoulder-to-shoulder with the Federal agencies when National forest resources are ablaze.

The military agencies certainly need adequate spectrum for their command and control operations. But the fact is that the war being waged everyday on the streets of the Nation's cities by a variety of public safety services being provided at the Local Government level is no less important, and people are dying and being hurt in our home towns, on the highways, in fires, as a result of criminal activity, than are being injured or killed in military action.

In earthquakes or floods, or any other widespread disaster, the Local Government responders always have a larger role than the Federal responders. They need every tool they can get their hands on, and communications is the one tool they would all cite as the first need.

When a civil airliner goes down, Local Government people handle the emergency response.

The national effort to curb drug abuse, a concern of all of us, is being carried out mostly at the Local Government level.

Each of these public safety operations, and many more, require the best communications systems possible, and they require spectrum.

State and Local Government agencies have millions, maybe billions, of dollars invested in backbone microwave systems to coordinate and extend the reach of their mobile communications systems. They need to preserve and expand the systems now in place, and they need many more of them. They take spectrum.

Our States, cities and counties (incidentally, with virtually no Federal financial support) are spending enormous amounts of money to install modern technology Enhanced 9-1-1 emergency telephone number systems to provide the fastest possible response when people need help.

(As an aside, perhaps if the Federal Government were sponsoring that effort financially, this Committee and others in Congress would be more aware of the swift growth of this life-saving and property-protecting tool. In fact, the Comptroller General of the United States has ruled that Federal agencies should get a "free ride" as far as 9-1-1 is concerned. The 9-1-1 service, where it is in operation, is paid for at the local level by a surcharge on each telephone line used by the public. However, the Comptroller General has held that Federal installations are exempt from this charge. APCO strongly urges this Committee to become more aware of the problems being encountered by our 9-1-1 people. There is no focal point in the Federal Government concerned with these problems. There should be. But that is a subject for another hearing.)

The spectrum implication of the 9-1-1 growth is that as these systems advance in technology, centralized 9-1-1 systems which handle law enforcement, fire and emergency medical calls for help are becoming the economical way for multi-jurisdictional organizations to handle the calls, and this new breed of communications center often requires a new, more sophisticated radio communications system to dispatch and coordinate the field responders.

The public safety community has no quarrel with the intent of S. 218 to make room in the spectrum for new commercial opportunities. We firmly applaud that intent of the bill, and will no doubt make good use of the new commercial services which will evolve. There must be the recognition by the Congress and the Federal Communications Commission, however, that satisfying the public safety needs of the citizens of the United States is of higher priority in allocations than commercial exploitation of the spectrum.

The Congress has recognized this and passed legislation in the early 1980's directing the FCC to satisfy those needs.

On December 8, 1983, Congress enacted Section 9 of the Fiscal Year 1984-85 Authorization bill for the Federal Communications Commission, amending the Communications Act to include a provision related to the needs of the public safety services.

This Section provides:

Sec. 9. (a) Funds authorized to be appropriated under section 2 of this Act shall be used by the Federal Communications Commission to establish a plan which adequately ensures that the needs of State and local public safety authorities would be taken into account in making allocations of the electromagnetic spectrum. In establishing such a plan the Commission shall (1) review the current and future needs of such public safety authorities in light of suitable and commercially available equipment and (2) consider the need for a nationwide contiguous frequency allocation for public safety purposes.

(b) Pending adoption of a plan, the Commission, while making assignments and allocations, shall duly recognize the needs of State and local public safety authorities.

The legislation should have taken care of public safety's problems as seen at that time. Its implementation, however, has left much to be desired, and in its pressures to respond to other spectrum claimants, the Commission has allocated and allocated and public safety's problems have not only persisted but have escalated in the urban areas of the country.

In response to the 1983 Congressional action, the Commission released a Notice of Inquiry in the matter of future public safety telecommunications requirements. The stated purpose of that proceeding was to solicit public comments to enable the Commission to develop a plan that ensures that the present and future requirements of State and Local Government public safety authorities are accommodated in allocations of the electromagnetic spectrum.

The Commission sought information on current problems with existing systems, anticipated growth, new applications and new operational configurations. The Commission got the information it sought and its Private Radio Bureau released a comprehensive report setting forth public safety's future requirements. That report must not be allowed to stay buried in the agency's files.

APCO submitted comments in response to that Inquiry stating that the principal issue is making adequate spectrum available for public safety operations. It pointed out that action must be taken to:

1. Alleviate current spectrum shortages.
2. Enhance the capability of inter-agency communications in emergency and disaster situations through networking and other techniques.
3. Ensure the availability of adequate spectrum to meet future needs, both short range (three to ten years) and long range (ten to twenty-five years).

The Commission subsequently allocated six megahertz of spectrum to public safety (821-824/866-869 MHz), and called for the development of fifty-five Regional Public Safety Plans to make the most efficient use of this spectrum in accordance with the varying needs of the identified Regions. The Regional Plans were to address both short- (1985-1995) and long-term (1995-2010) needs. APCO supported this action by the Commission, though in the major metropolitan areas, this allocation amounted to only a short-term plan.

Even on a short-term basis, Regional Planning Committees have identified a near-term (today) spectrum shortfall in the major metropolitan areas, such as New York, Los Angeles and Miami.

I tell you that the public safety community in the Southern Florida Metropolitan Area is using every channel allocated to it in the most efficient way possible under the parameters of the 1983 legislation.

The channels available before 800 MHz frequencies were allocated are being used and re-used as often as possible—sometimes too closely to one another to permit communications without interference between systems. Every new system or system expansion going into service in some parts of this Region is going in at the risk of causing interference to another public safety communications system.

In Dade County, Florida, alone, there are 70 different public safety agencies trying to provide vital radio communications of one kind or another to their people on the frequencies available below 800 MHz band.

They are using 193 different channels in Dade County; channels which cannot be reused within interference range of equally vital operations in the heavily populated adjacent and nearby counties and cities. By the same token, the channels being used in the adjacent and nearby counties and cities cannot be used in Dade County. The others are in the same shape as Dade.

APCO holds certification from the FCC as the frequency coordination agency for certain public safety radio services. The State of Florida Division of Communications (DivCom) serves in an advisory role to APCO for frequency coordination matters. DivCom has a professional engineering section devoted to this task.

The trend within the past few years in most of Florida, DivCom observes, has been one of diminishing of "clear" channels. The ,basis for channel assignment has regressed from "the best" to "the best of the worst", to just "bad" in most cases. In the absence of all else, tolerating interference becomes preferable to have no communications at all.

Obviously, the people using these channels while protecting life and property take serious chances with their own lives and safety when less than adequate communications exist. Trunking, which is one of the means for efficient spectrum utilization, cannot be employed in the "lower" bands, since sufficient spectrum in "blocks" is not available.

An engineer with Florida DivCom whose job it is to find usable radio channels for public safety agencies who are modernizing or expanding their communications systems advises me as follows:

As South Florida APCO Local Advisor, I have experienced many proverbial "bumps and bruises", "headaches", and anything else that accompanies fruitless coordination efforts—not to mention explaining the bad news to unfortunate applicants. Applicants either try other bands, obtain letters of concurrence, conduct engineering/field studies, seek inter-service or inter-category sharing, or withdraw their applications.

Since withdrawing the application is usually a "last resort", the other options could cause up to a year (or more) on coordinating one application. Due to recent experience, I won't encourage any one option. I feel the applicant may be only wasting time and money (tax dollars).

I used to be optimistic that I could find "just one more" frequency in an otherwise dry well—not any more. Pursuing inter-service or inter-category sharing is practically a wasted effort.

There is not sufficient spectrum available to us on these lower frequencies in any one "block" to take advantage of "trunking", which is one of the spectrum-efficient advances available in equipment operating above 800 MHz.

The 70 public safety channels previously available in the 800 MHz band and the subsequently allocated 821-824/866-869 MHz band are all in use or assigned under the Regional Plan for this area, under construction or awaiting funding or other clearance. They will be in use, and will be re-used with as close spacing as possible, in a very short period by the 67 Florida counties and state agencies devoted to public safety in the state. Trunking equipment is available on these frequencies and will be used for spectrum efficiency in any jurisdiction which has a need for enough channels to realize its efficiency (five or more channels). This is a requirement under the Regional Plan.

There are also 150 "general access" channels in the 800 MHz band allocated for use by both public safety, business and other types of radio users. All of these have been in use for some time.

In the Regional Planning process for the 800 MHz band frequencies for Florida, the short-term needs presented themselves in the South Florida area at the outset. The original requirements of actual channel loading needs in 1989 allotment fell short by 21 channels (18 for the Metro-Dade East area, 1 for Broward County, and 2 for the Ft. Lauderdale area consolidated system).

This, even before the first license was issued, presaged potentially critical spectrum scarcity once the Regional Plan would be accepted by the Commission. The plan has since been accepted by the Commission, in effect indicating the Commission's concurrence that this frequency space will be used as efficiently as possible as the plan is followed.

The Commission's remedy for spectrum congestion is more efficient utilization of already allocated spectrum. The public safety community has employed this prudent concept to all practical and functional limits.

With spectrum demands escalating to the degree where Congress is very properly expressing its concerns, as evidenced by 5.218, and with the FCC's Inquiry into future public safety spectrum requirements evidently inert, it imperative that the public safety community step forward in this forum to vigorously assert what it needs.

The attached appendix provides an analysis of these spectrum needs for a major urban area (Los Angeles in this analysis, but it would apply to major metropolitan area) and indicates that public safety will require a long-term allocation of 100 to 150 MHz if it is to meet the unique and specific requirements of public safety operations.

Absent such allocation, public safety users' only access to these future technologies may be through the purchase of common carrier services which may not meet the specific operational, coverage and reliability requirements of public safety users. These common carrier systems may not be available in a timely manner in many areas of the country; they may not be able to provide the priorities required by public safety operations; and they may not be cost effective for many public safety entities.

If the US public safety community is to continue in its leadership role in the application of new and effective communications technologies, Congress and the FCC must now clearly identify its spectrum needs and take action to satisfy them.

Please allow me to repeat myself, since it is so critical.

The major urban areas of the United States are or will shortly be entirely out of spectrum to modernize and expand their public safety systems and/or to implement new systems with today's state of the art technology. There are up to a dozen areas that require immediate or near-term (three-to-five more years) relief. New York, Los Angeles, Chicago, Southern Florida, Dallas-Fort Worth, and possibly other metropolitan areas are in this situation.

More rural areas of the country, such as Alaska, Montana, Wyoming, Idaho, and other sparsely populated areas, have enough public safety spectrum for the immediate future. But no area of the country has public safety spectrum adequate to accommodate the emerging technologies coming for our use.

In satisfying public safety's requirements for mobile communications systems, the huge investment of the State and Local Governments in point-to-point (microwave) systems must not be destroyed.

APPENDIX A

Public Safety Future Spectrum Requirements, 1990–2010

Introduction

There are two major trends in private mobile radio (PMR) that will have a significant impact on future spectrum needs. The first is the increasing need of wide area mobile and portable users, such as public safety, to have immediate access to the full range of information services, including facsimile, text, graphics, imaging and video, as well as access to the public switch telephone network. These services will supplement, not replace, the increasing demand for voice dispatch. In fact, message lengths will increase with on-line access to information that supports real-time decisionmaking between central dispatch and mobile field personnel. The second trend that will have a major impact on future spectrum is the move toward the cordless office environment, that is, the wireless PBX including access to data and document files, graphics and video. It will also be necessary to provide full and seamless connectivity between local and wide area systems. Central support and field personnel will be in constant touch and able to immediately respond to emergency situations.

Future Services

Future systems will support an increasing number of voice, data, graphics and video services including dispatch/telephone interconnect, transaction processing, facsimile, snapshot, decision support, slow video and picture phone as described below:

1. *Dispatch / Telephone Interconnect*

This service will continue to provide one-to-many, selected groups and one-to-one communications with immediate call set-up and priority interrupt. Telephone interconnect will be available on an as required basis with access to the local area wireless PBX and the public switched telephone network.

2. Transaction Processing

The service provides short duration packetized alpha/numeric data typical of the status-message system prevalent today.

3. Facsimile

This service is identical to that provided for land lines. The information is generally contained on a single sheet of paper. It is a black and white image and the primary content is alpha/numeric. The resolution and quality of the received information is modest.

4. Snapshot

The snapshot service goes beyond facsimile. It provides much higher resolution, gray scale and/or color and could contain a much higher proportion of non-alpha/numeric information. Examples of snapshot service would include the transmission of a photograph (mugshot) of a criminal suspect to a police officer in the field or the transmission of a picture of a crime or accident scene from the field to central headquarters.

5. Decision Support

This is a data service that may include the transmission of significant amounts of data and provides for interaction between the field personnel's terminal and a central data file. Typical applications include "expert systems" that support on-line decisionmaking by field personnel. As an example, this could include firefighting decisions where volatile chemicals are involved.

6. Slow Video

This service would provide high resolution color images at modest frame rates (i.e., one frame per second). This could be provided on a real-time basis or a convenience store-and-forward basis. As an example, an emergency medical technician could provide visual information of patient injuries to a doctor specializing in certain types of traumas.

7. Picture Phone

This service would provide a color video image of the individuals communicating with one another. The content would be restricted to human faces and the scan rates would be consistent with the minimum motion that would occur in the images. This service could be used where visual identification is desirable.

Growth Trends

In 1985, APCO estimated the public safety mobiles and portables in operation in the major urban areas and projected their growth to the year 2000. As an example, the mobiles/portables in the Los Angeles area in 1985 were estimated to be 78,000 growing to 155,000 by the year 2000. The actual growth of public safety licensed transmitters, 1985–1990, as published by the FCC, was considerably greater than estimated in 1985. Using this growth rate results in a mobiles/portables population of 135,000 year ending 1990 in the Los Angeles area. Using the more conservative long-term growth of 5 percent for the period 1990–2010 would result in 220,000 mobiles/portables in the year 2000 and 360,000 by the year 2010. This forecast is based on population growth, increased penetration of public service areas and the development of local area wireless PBX systems.

Spectrum Forecast 1990–2010

Table 1 shows the spectrum required for each service for the Los Angeles area. It is based on a 50-percent migration of public safety users to advanced technology systems (i.e., 180,000 dispatch users) by the year 2010 and projected levels of usage for each service type as indicated. Based on these assumptions, a 117 MHz public safety allocation is required to support future advanced system technology in major urban areas. An initial allocation of 20 to 30 MHz is required in the near-term to support the development of these advanced technologies and the corresponding delivery systems. Additional migration and service usage can be supported in the future through increased capacity resulting from further development of source information coding technology which will be driven by the combined demands of both the wireline and wireless telecommunications markets.

TABLE 1.—Spectrum Requirements, 1990–2010

Service	Content	Users	Usage[1]	Spectrum
Dispatch[2]	4.8 kbps	180,000	1.5/hr.	42
Transactions	1k bytes	180,000	10/hr.	2
Facsimile	250k bytes	110,000	2 pages/hr.	22
Snapshot	400k bytes	55,000	0.5/hr.	11
Decision Support	200k bytes	75,000	0.5/hr.	8
Slow Video	72 kbps	55,000	0.25/hr.	20
Picture Phone	54 kbps	20,000	0.5/hr.	12
Total				117

[1] Per user, that is, per mobile/portable.

[2] Indues telephone interconnect.

Senator Inouye. Thank you, very much, Mr. Carmody. I note that all of you have indicated support for S. 218. I would assume by that that you are opposed to spectrum auctions. May I have your thoughts on the levying of spectrum fees?

Mr. Schelle. Mr. Chairman, I said earlier that we would desire to be judged on our merits because we think we are good in providing public service. We recognize the need for funds for the United States. I could support a spectrum fee if it were not only levied on the new technologies but if it were also levied on the existing technologies, such as cellular and paging paying so we'd have a level playing field. I also would support a transfer tax.

Mr. Roehrs. I agree.

Senator Inouye. Dr. Nagel.

Dr. Nagel. I believe in my testimony we mentioned a licensing scheme. The manufacturers of the equipment would return to the Government a license fee. The use of the system would then be a free public usage once that license fee has been paid, so we think in our case of our proposal we have identified a mechanism that could return to the United States an adequate payment for the use of the spectrum.

Mr. Carmody. Mr. Chairman, public safety would hope that they would be exempt from any user fees or auction fees. In our case user fees is kind of a horse biting the horse. It all has to pass right on back to your constituents back home because we are funded by them, and we would not be competitive in an auction market because our resources are very limited.

Senator Inouye. The FCC at this point in time has authority to restrict sales of broadcast licenses. In fact, the FCC requires that you build and operate the station for at least a year before you sell it. What if that was put into the bill restricting sales?

Mr. Schelle. I would support it. I would even extend it beyond 1 year.

Senator Inouye. Mr. Roehrs.

Mr. Roehrs. Let me understand the question correctly. What you are saying is that if a license were granted they would have to hang on to the property, develop it before they would sell it after one year?

Senator Inouye. They would have billed whatever facility is necessary and operate for a year before they could sell it.

Mr. ROEHRS. They would perhaps get around that by working out some sort of a mutual agreement with somebody that could fund them and have a prearranged sale date after that 1 year.

Senator INOUYE. Well, the FCC has the authority to approve the sale, and I hope they can see through that.

Mr. ROEHRS. I would hope so too.

Dr. NAGEL. In the case of data PCS, it is a different type of system than I think would be appropriate to that mechanism. In data PCS there shall no fixed stations and no broadcast, rather it supports what we call—referred to as spontaneous networking, people walk into a room, they turn on their telecomputers and they are on the network in a local area, so as long as the legislation were amended to admit those sorts of usage, it would be possible to do just what you say, I believe.

Senator INOUYE. We wouldn't charge you any fees, Mr. Carmody.

Mr. CARMODY. Thank you, Mr. Chairman.

Senator INOUYE. Mr. Schelle, you spoke in favor of the comparative hearing process. Do the others support that process?

Dr. NAGEL. Well, again, in the case of data PCS there is really no need for dealing with the exclusivity process because everyone would benefit. The particular technologies that we are developing, for example, are based on some proprietary networking, software technologies that we call "Apple Talk." We've recently begun licensing Apple Talk to other members in the industry, and we are very serious about making this proposal for the entire computer industry and the whole population of users of personal and portable and laptop and telecomputers, so——

Senator INOUYE. In other words, all you need right now is the spectrum?

Dr. NAGEL. That's correct.

Senator INOUYE. And it can be operational tomorrow?

Dr. NAGEL. Well, if not tomorrow, very shortly. The technologies are not, in this case, the show stopper, it is the availability of the spectrum.

Senator INOUYE. Mr. Roehrs, how much does your instrument cost?

Mr. ROEHRS. Per unit the estimated cost is going to be around $480 for the mobile and/or the fixed unit that goes in the home we estimate the complete system would cost right around $1,000. We compared that with cellular. Cellular, the average cost of cellular per month is $140 per month, so within the first year they would have the equipment bought and paid for. Thereafter there would be no associated charge to use the system.

The system we have is, I think, substantially different than—it is obviously different with cellular. With cellular you have to license spectrum to an operator or a carrier. And in essence what they have is a monopoly.

With CELLCALL, I have eliminated the need to have a carrier operate the network and I have done that by microcomputer technology and innovations with transmission techniques such that each radio set then controls the network independently. I envision a whole array of different products that can also stem from this such as cordless phones that have a range of one-half to a mile. You would have a high degree of security, people could not eavesdrop, you would never have to worry about contention between your cordless phone and maybe the next door neighbor having one that is operating on the same frequency, so the system that I have developed is very cost effective and very spectrum efficient. I estimate that with a mere 50 megahertz of the spectrum I could put a phone in every car and never congest across the United States, including the largest metropolitan areas.

Senator INOUYE. Thank you all very much. You have been extremely helpful.

Mr. ROEHRS. Thank you.

Senator INOUYE. We'll take a 5-minute recess.

[A brief recess was taken.]

Senator INOUYE. Our last panel this afternoon consists of the following; Director of Wireless Architectures, AT&T Bell Labs, Dr. Lawrence Gitten; the President of IDB Communications Group, Inc., of California, Mr. Edward R. Cheramy; the Vice President of Regulatory Affairs, Motorola from New York, Ms. Veronica Haggart; and the Executive Vice President of the Local Area Telecommunications, Inc. of New York, Mr. Craig Roos.

Dr. Gitten, may I call on you first, sir?

STATEMENT OF DR. LAWRENCE GITTEN, DIRECTOR, WIRELESS ARCHITECTURES, AT&T BELL LABS

Dr. GITTEN. My name is Lawrence Gitten. I am the head of the wireless architectures department of AT&T Bell Laboratories, and in that role I coordinate AT&T technical efforts in support of wireless communications.

I am testifying today in support of S. 218, the Emerging Telecommunications Technologist Acts introduced by Senator Inouye, chairman of this Senate Communications Subcommittee, and cosponsored by four other Senators. I want to especially commend you, Mr. Chairman, and the cosponsors of the bill for your foresight in introducing this legislation.

AT&T in general, including AT&T Bell Laboratories, is heavily involved in the development of new products which will require the use of radio spectrum. Wireless service in some products, such as personal communication services, wireless PBX systems for office use, point of sale communications, remote data collection systems offering wireless access to host computers, remote public service communications for police and emergency applications and emergency telephone service restoration all are now technically possible but will require additional spectrum allocations in order to have their full benefit and value to the United States realized.

The lack of spectrum which can be allocated for these new wireless services and products is one of the principal impediments to their deployment and use. AT&T Bell Laboratories has long been active in developing group radio communications technologies. Indeed, the concept of cellular radio was first stated by D.H. Ring of Bell Laboratories in 1947. The technical concept of cellular radio systems had been developed at Bell Laboratories by 1960.

Despite this work, work in practical systems could not start for approximately 14 years until the frequency allocation was obtained. Once frequency was allocated in 1974, AT&T developed the advanced mobile phone service which was approved for trial in 1978.

Even so, regulatory proceedings further delayed full introduction to the public. The FCC adopted rules to implement cellular licensing in 1991, and certain licenses have still not been issued. That is 44 years since the initial concept. The industry's frustrating experience with respect to cellular radio technology vividly demonstrates the need for S. 218.

Today the introduction of practical personal communication services and wireless products to the public must proceed at a much faster pace than was realized for the introduction of cellular service. Foreign competitors in Europe and the Far East will not stand still while we delay. They are now deploying their own wireless applications. For example, cellular radio systems have achieved nearly three times more market penetration in certain Scandinavian countries than in the United States. Largely because of earlier surface introduction in Scandinavia.

Deployment of personal communication services must begin promptly in the United States if we are to remain competitive in this market. In its response to the FCC general docket number 90–314, AT&T suggested marketplace base licensing procedures to expedite the process. We suggested that new personal communications service operators negotiate with existing users over a broad range of spectrum, achieving coordination agreements prior to applying for spectrum.

The user need for spectrum is clear. There are nearly 40 million cordless phones in service and 10 million more are installed each year. This resulted in the recent request for new channels to be made available in the megahertz band. Similarly there are 5 million users of cellular services with 2 million more added each year. Based on present-day technologies, large cities like New York and Los Angeles will soon experience shortages in available spectrum. These shortages will cause industry to resort to costly new technology alternatives prematurely, a problem not faced by the rest of the world.

This is not only an issue for the cordless and cellular user segments. High growth is being experienced by paging and special mobile radio services. There is a growing interest in portable radio services—I'm sorry, portable data services such as the one we just heard about, putting more pressure on available spectrum. These trends suggest the urgency for beginning the process for S. 218 as soon as possible.

The success of the services I have mentioned has resulted from the availability of enough bandwidth to economically provide the same level of service quality and performance that our citizens have come to expect from the U.S. telecommunications network. It is certainly not in the national interest to allow for compromises in service quality and availability. Additional spectrum needs to be made available.

Again, let me commend you and the other members of this committee for understanding the need for this legislation. Thank you for the opportunity to testify here today.

[The prepared statement of Dr. Gitten follows:]

PREPARED STATEMENT OF DR. LAWRENCE J. GITTEN

My name is Lawrence Gitten. I am the Head of the Wireless Architecture Department of AT&T Bell Laboratories.

I am testifying today in support of 5.218, the "Emerging Telecommunications Technologies Act of 1991" introduced by Senator Daniel K. Inouye, Chairman of the Senate Communications Subcommittee, and cosponsored by four other Senators. I want to especially commend you, Mr. Chairman, and your fellow cosponsors, for your foresight in introducing this legislation.

AT&T in general, including AT&T Bell Laboratories, is heavily involved in the development of new products and services which will require the use of radio spectrum. In support of AT&T's wide ranging manufacturing and service efforts, we at Bell Laboratories are investigating technologies that will enable more efficient use of radio spectrum: advances in digital signal processors, leading edge algorithms for speech and image compression, new battery and packaging technologies to support pocket size portable terminals, and innovative network architectures that integrate into the public network the service intelligence which provides the user flexibility our wireless vision proposes. We also have trials in place to test cordless public telephone services and to explore use of innovative new digital radio technology to supplement copper local access in hard-to-serve locations. Finally, we are active in United States and international standard bodies supporting open networks which will maximize user benefits.

AT&T's vision of the domestic telecommunications future includes an environment where public communications carriers can deliver any combination of voice, data and image services to a person rather than to a location or specific terminal, with maximum convenience, economy and reliability. There is every indication that Americans want the freedom and control of their communications environment that this type of system would bring. They want to be freed from the restrictions of a telephone cord; they want personal mobility in order to have access to their services from anywhere; and they want to acquire much greater control over the disposition of the messages sent to them. Examples of this desire for greater mobility and flexibility are today's cordless and cellular phone markets. There are today, in the United States, approximately 40 million cordless phones, with a market growth of about 25 percent per year; and more than 5 million cellular phones, with a market growth of approximately 50 percent per year. And, just ten days ago, AT&T announced its second cord-free business telephone—the PARTNER™ cordless Telephone which joins our MERLIN cordless as the only cordless business telephones on the market.

Additional wireless services and products which should be brought to market to address the demands of American telecommunications consumers include a variety of emerging personal communications services, wireless PBX systems for office use, point of sale communications, remote data collection offering wireless communications to office "host" computers, and remote public service communications for police and emergency applications. In addition, enormous value added can be achieved through combining wireless technology with other technologies, including:

- intelligent network services to forward calls selectively (e.g., forwarding critical calls to the subscriber and nuisance calls to voice mail, while facsimile calls are routed to the nearest terminal with appropriate capabilities);
- data services to permit flexible communications to and from notebook sized, portable personal computers; facsimile delivery of blueprints to remote locations; remote data collection at cash registers, parking lots, mobile medical vans and libraries; traffic control; and remote filing of news reports; and
- speech recognition to permit voice dialing for safe operation of telecommunications equipment in vehicles; and speech to database applications to support public safety (e.g., police use for improved license plate verification).

All of these applications are now technically possible, but many will require additional spectrum allocations in order to realize their full benefit and value to American consumers and producers. The lack of spectrum available for these new wireless services and products may be more critical a hindrance to bringing them to market than the benefits obtained from all the research work I mentioned a moment ago in bringing these products to market.

AT&T Bell Laboratories has long been active in developing new radio communications technologies. Indeed, the concept of cellular radio was first stated by D. H. Ring of Bell Laboratories in unpublished work dating back to 1947, and the technical concept of cellular radio systems using frequencies in the 800 MHz range had been developed at Bell Laboratories by 1960. Despite this technical work, however, work on a practical system could not start for approximately 14 years until a frequency allocation was obtained. Once frequency was allocated by the Federal Communications Commission in 1974, AT&T developed the Advanced Mobile Phone

Service (or "AMPS"), which was approved for a trial in 1978. Even then, however, regulatory delays associated with spectrum licensing further delayed full introduction to the public. The FCC ultimately adopted rules to implement cellular licensing in 1981, and certain licenses still have not been issued. The industry's frustrating past experience with respect to the introduction of first generation analog cellular radio technology foreshadows the need for S. 218.

Today, the introduction of practical personal communications services ("PCS") and wireless products to the public must proceed at a much faster pace than was realized for the introduction of cellular service in the past. Our citizens deserve better. Foreign competitors in Europe and the Far East are not standing still while we delay. In part as a result of limited available radio spectrum in the United States, foreign competitors have moved ahead of United States firms in developing PCS, and some European competitors appear to be ahead of the United States in cellular applications. Cellular radio systems have achieved nearly three times more market penetration in certain Scandinavian countries than in the United States, largely because service was introduced earlier. In addition, under the auspices of the European Telecommunications Standards Institute, the European Community will introduce a Pan European, second generation, digital cellular system in 1992. It is claimed that this system is the only truly digital cellular system in the world, and it is being proposed as a world standard to the appropriate organizations under the United Nations.

In the United States however, due to a lack of unused spectrum into which a second generation cellular system could evolve, the industry was forced to commit its resources to developing a hybrid approach to spectrum usage that combines analog and digital functions. This requires a higher degree of complexity and presently provides less functionality to the end-user compared to its European counterpart. If spectrum had been available (as it was in Europe), it is likely that the United States industry would have focused on enriched services and applications and would not now be in the position of playing "catch-up" to the Europeans, nor would the United States be in a defensive posture in international standards bodies in the face of the European Community's efforts to have its own standards adopted internationally. The possibility that foreign standards would be adopted internationally poses a serious threat to United States competitiveness in this critical technology and in other wireless applications.

Thus, development of personal communications services must begin promptly in the United States, if we are to remain competitive in this market. In the United States, spectrum must first be allocated and licensed by the Federal Communications Commission. Because AT&T is vitally interested in new wireless services and products, it has filed Comments and Reply Comments in the FCC's General Docket No. 90-314 suggesting a new, marketplace-based approach to spectrum allocation. Copies of these pleadings are attached. The task of spectrum allocation in the United States is more difficult than in Europe, because the spectrum now most desired for digital cellular and PCS use in the United States is currently occupied by other, more traditional uses which themselves are of considerable value to the public. We must be careful not to blindly displace valuable older technologies, simply because of our need to develop new ones. However, while carefully balancing all the various interests involved, the United States must find and efficiently allocate spectrum for wireless services and products made possible by technologies being developed at research and development centers such as AT&T Bell Laboratories.

To accomplish this, AT&T demonstrated in its Docket 90-314 pleadings how the FCC could use the marketplace to the greatest extent possible in order to accomplish this objective. The procedure suggested by AT&T is that new personal communications service operators negotiate with existing users over a broad range of spectrum, achieving coordination agreements as they are able. These agreements may result in sharing of spectrum, sharing of capacity or relocation of current users to other frequencies or transmission media. In this way, marketplace forces will permit existing uses to remain where they are more valuable, yet, will favor personal communications services where they are expected to be more valuable. The marketplace will dictate the proper coordination and balance between the two. Such marketplace forces will also determine which personal communications services are successful, based on consumer interest and need. This approach, to the extent adopted, for transfers of both assigned and unassigned spectrum should strike a more efficient balancing of the interests involved, and should achieve that balance much faster than the traditional reliance on regulatory procedures such as comparative hearings.

Even using such marketplace-based licensing procedures, however, the amount of economically usable spectrum that the FCC could make available for personal communications services, additional cellular operators, cordless telephones,wireless applications, and residential uses in the existing spectrum environment will probably be limited, and in turn will limit the availability of these new wireless products and services. In order to expand availability of those services to a much broader-based market, spectrum now dedicated to Federal Government use should be made available, as proposed in S. 218.

Spectrum allocation and licensing are not the only regulatory hurdles which must be cleared before ubiquitous personal communications services become a reality. Certain technical issues must also be addressed. Chief among these, in AT&T's view, is the numbering plan which will be needed to accommodate personal numbers worldwide—as opposed to the telephone station numbers which are now in use. The development of the new or modified numbering plan should be conducted by a neutral party or body which is not affiliated with any of the potential competitors or other interested parties. Even with diligent attention, solution to the numbering plan and other potential technical issues will require some time. In order to facilitate the evolution of personal communications services in a reasonable time-frame, we must begin now to allocate spectrum and address these technical issues. If we do not begin promptly, we may find ourselves completely outdistanced in this market by European and Far Eastern competitors in the next few years.

S. 218, even if it were passed tomorrow, contemplates a delay of several years before spectrum can be made available for personal communications and other wireless technologies. Indeed, one recommendation I have for improving the legislation would be to shorten the time periods for implementation, as well as certain other technical recommendations, which we are willing to discuss with your staff at an appropriate time. The built-in implementation delays now contained in the bill make it all the more important to pass the bill during the present Session of the 102nd Congress, if at all possible, so that the process of spectrum reallocation can begin now. Delaying passage of this bill until future sessions of Congress will only put the American telecommunications industry at a greater and greater disadvantage relative to its foreign competitors, and will further retard the introduction of the new services and products to the public. I therefore urge the Congress to act favorably on S. 218 as quickly as possible. In addition, the design parameters for personal communications services and other wireless applications can be very different if it is known in advance that additional spectrum will be available. For this additional reason, it is important for the Congress to act now on S. 218.

Again, let me commend Chairman Inouye and the other Members of this Subcommittee for understanding the need for this legislation. Thank you for the opportunity to testify here today.

Senator INOUYE. Thank you very much, Dr. Gitten. Mr. Cheramy.

STATEMENT OF EDWARD R. CHERAMY, PRESIDENT, IDB COMMUNICATIONS GROUP, INC.

Mr. CHERAMY. I thank you, Mr. Chairman. With your permission, I'd like to ask Bill Wisniewski to come up and begin assembling one of our transportable INMARSAT units to illustrate the use of spectrum dependent applications.

IDB Communications is a provider of satellite transmission services for broadcasters and data users around the world. Most radio games and television sporting events that you hear on radio or see on television are brought to you using IDB's facilities. We also use satellite facilities and other facilities out of the Persian Gulf both for the Defense Department and for broadcasters and other media to bring the news of the gulf war back to the United States.

What Bill is demonstrating is a terminal that is used with the INMARSAT satellite system. Such terminal was used by the Washington Post, the Wall Street Journal, and a number of other communications companies to provide news back to the United States.

IDB supports S. 218. We believe that more spectrum is required. However, we would encourage the Congress to encourage users of the spectrum to only use the radio frequency spectrum, the over-the-air spectrum for those things that absolutely require its use.

Where there are alternatives available, fiber optics and the like, we would certainly encourage the use of those. Just because spectrum can be used for a certain application, does not mean that it should be used. We would say that spectrum should be reserved for those applications where it must be used. For example, for maritime communications for ships at sea, and for aeronautical communication for aircraft flight, customers would rely upon a terminal similar to this on the ship or built into the fuselage of a plane to communicate to the ground. We think those applications require that spectrum be allocated to them, but certain other technologies that do not require the use of the airwaves should not be allocated spectrum.

With regard to the issue of spectrum auctions and the like, we believe in the competitive process and believe that spectrum should be allocated on the basis of, say, long-term leases with competitive bids, but we are opposed to one-time sell it now and never see it again auctions.

And so these terminals like the one being demonstrated weigh about 80 pounds and are in use, interestingly, all around the world. Unfortunately, the spectrum which is allocated for use by these terminals everywhere else in the world is not available to us in the United States. That spectrum has been allocated to an organization that does not plan to use it for the next 3 to 4 years, and so while we have the capability and the use of it elsewhere around the world, we can't use it here in our own country.

And one last illustration of the use of the technology. This is what a unit will look like by the end of the year. The antenna is on the lid of the briefcase and the terminal itself is in here. This will be a working model using the same satellite system as this one by the end of the year for use by news gatherers and others for emergency communications and the like, and so, again, we support bill S. 218 and we will be pleased to answer your questions. Thank you.

[The prepared statement of Mr. Cheramy follows:]

PREPARED STATEMENT OF MR. EDWARD R. CHERAMY

My name is Edward R. Cheramy, and I am the President of IDB Communications Group, Inc. I am pleased to be here today to testify on S. 218, the "Emerging Telecommunications Technologies Act of 1991." I have prepared a written statement which I would like to request be included in full in the hearing record Please allow me to summarize that statement by briefly describing IDB, discussing the proposed legislation, and detailing some exciting new spectrum uses. Finally, I would like to demonstrate an example of a spectrum-dependent communications technology.

IDB is a leading provider of satellite transmission and distribution services in the United States and around the world. IDB is based in Los Angeles, with divisions in New York City, Rockville, Maryland, and Dallas, Texas Founded in 1983, IDB has enjoyed enormous revenue growth (see Exhibit 1), and anticipates over $100 million in revenue in 1991, up from $20 million in 1988.

IDB owns and operates major teleport facilities in Los Angeles and New York; a nationwide network of over 30 fixed satellite earth stations in virtually every major metropolitan area; and a fleet of transportable earth stations deployed worldwide. IDB provides satellite distribution of both the television and radio feeds of most Major League Baseball, National Basketball Association, and National Hockey League contests. IDB is well known for using transportable satellite earth stations to cover fast-breaking news events around the world, including U.S.-Soviet summit meetings in recent years from locations such as Iceland, Malta, and Moscow and the student protests in Tienanmen Square, China.

During the Gulf War, IDB worked around the clock to provide satellite links with the Persian Gulf. IDB had equipment and/or technicians in Amman, Jerusalem, Baghdad, Riyadh and Dhahran. IDB provided broadcast coverage to major news organizations, including CNN, ABC, CBS and NBC. IDB also provided data and voice communications by means of mobile satellite facilities to a wide variety of newsgathering organizations. Finally, IDB provided, and continues to provide, the Department of Defense with critical satellite communications data links.

IDB supports the passage of S. 218. It is imperative that spectrum be made available to new technologies, and also, to emerging spectrum efficient telecommunications technologies that are rapidly using up their small spectrum allocations. Freeing up 200 MHz of scarce spectrum is essential to maintaining the U.S. as the world's leader in telecommunications technology.

IDB would like to focus briefly on one portion of the legislation, namely Section 6, entitled "Distribution of Frequencies by the Commission." IDB firmly believes that Congress must provide the FCC with greater guidance on the allocation of the spectrum to be made available by S. 218.

IDB believes that radio frequency spectrum is a government resource. Like other government resources, users should be required to pay a reasonable price for the use of this valuable, and scarce, resource. IDB submits that long term leases of spectrum would provide many benefits. First, of course, the government would be able to raise substantial revenue. Second, users would have a strong incentive to utilize the spectrum for the most efficient purposes. For example, digital technology now enables up to 8 voice circuits to be carried in the same amount of spectrum ordinarily used to carry one voice circuit. Although the equipment required to provide such multiple voice circuits is not inexpensive, by placing a market-driven price on the use of spectrum, communications carriers may well find it economically advantageous to use such equipment so as to utilize less spectrum. This simple marketplace approach is largely absent today from most spectrum usage decisions. As a result, there is a terrible waste of scarce spectrum.

A related benefit of leasing would be that certain communications services not dependent on radio frequency spectrum would migrate to fiber optic or coaxial cable. Again, if spectrum is properly valued, users will find it worthwhile to use non-spectrum transmission facilities in certain instances. Obviously, this should be encouraged.

To further encourage efficient spectrum utilization, IDB proposes that leasing fees increase with the amount of spectrum used. For example, 1 unit of spectrum might cost $1 per year, while 2 units would cost $3, and 10 units would cost $100 Of course, leasing fees would have to vary depending on the band of the spectrum being used, whether or not the frequencies are shared or exclusive, and the geographical range of the frequencies before they can be reused. Congress should offer guidance on these issues, but ultimately the FCC will have to work out the details.

IDB is strongly opposed to a spectrum auction This one-time revenue raising approach will favor the largest companies, and will not have the ability to adapt to changing needs and technologies down the road. IDB also opposes any spectrum fee based on revenues. Such a fee is nothing more than a tax, which actually penalizes efficient users of spectrum who are able to earn the most revenue from their services.

At present, the government retains title to, but leases for private use, offshore drilling areas and portions of national parks and national forests. IDB submits that spectrum should be leased in a similar manner.

Additional spectrum is needed not only for brand new technologies, but also for emerging technologies like mobile satellite service. In January, IDB began providing maritime service from both ship earth stations and so-called land-based ship earth stations. IDB's maritime service enables ships anywhere in the world to establish telephone, data, facsimile or telex links with virtually any country. Even more exciting, perhaps, IDB will be initiating aeronautical mobile satellite service in the next few months. This service will enable commercial and corporate aircraft flying anywhere in the world to establish instantaneous, high quality voice and data links with any country, for use by passengers, the airline crew, and air traffic control. IDB is building 3 coast earth stations in the U.S. to provide mobile satellite service. It will be the first non-1NMAR'SAT signatory in the world ever to own and operate such facilities.

Finally, I would like to describe a current use of available spectrum. Using the global 1NMARSAT system, IDB has been able to instantaneously link reporters in the Gulf Region, including Baghdad, with the U.S. for live news reports. If the Chair permits, IDB would like to demonstrate to the subcommittee the deployment of an 1NMARSAT terminal that can be used for voice or data communications in remote areas where there is no access to landline telephone facilities.

Bill Wisniewski, Senior Director, Business Development of IDB's International Division, based in Rockville, Maryland, is here to demonstrate how reliable communications links from the most remote areas can be established in a matter of minutes. The deployment of the mobile terminal does not require any technical background. It can, and has, been used by reporters in the field. CNN used such a terminal to broadcast live reports from Baghdad. The entire unit fits in one hard-sided carrying case weighing only 80 pounds. Within the next few years, technological advances will bring the weight of similar terminals down to undor 20 pounds.

Once the terminal has been deployed, it transmits its signal to a satellite. The satellite receives the signal, amplifies it, and re-transmits it to a large coast earth station, where the signal is interconnected with the public switched telephone network.

In summary, IDB is concerned that there is inadequate spectrum allocated to meet the projected demands for mobile satellite service. Maritime and aeronautical mobile satellite services are dependent entirely upon satellites for reliable communications. By contrast, many other spectrum users, including many land mobile users, can use either terrestrial or satellite technologies. IDB believes that the reallocation of 200 MHz of spectrum will alleviate overcrowded spectrum for a while. However, by adopting an economically sound, market driven leasing policy, Congress will assure that the technologies which need radio frequency spectrum the most, and which use that spectrum the most efficiently, will have adequate spectrum available to them for the foreseeable future.

Thank you for the opportunity to appear before you today. I would be pleased to answer any questions that the members of the Subcommittee may have regarding my testimony.

Exhibit 1.—IDB Communications Group Revenue Growth—1986, $6.3 million; 1987, $12.1 million; 1988, $20.1 million; 1989, $60.7 million; and 1990, $86.5 million.

Senator INOUYE. All right. Thank you very much. Miss Haggart.

STATEMENT OF VERONICA HAGGART, VICE PRESIDENT, REGULATORY AFFAIRS, MOTOROLA

Ms. HAGGART. Thank you, Mr. Chairman. My name is Veronica Haggart. I am vice president and director for regulatory affairs in Motorola's government relations office in Washington. We appreciate the opportunity to testify before this subcommittee in support of S. 218. I have submitted a written statement and ask that it be made a part of the record.

As a world leader in mobile communications technologies, Motorola's vision for the telecommunications industry is that of a wireless society. We are entering the decade of personal communications services as was mentioned earlier today. From Motorola's perspective, this era picked up significant momentum 2 years ago this month with the introduction of our pocket-sized portable cellular telephone, the Microtac. Since then an exciting era of new products and services has begun. This month we are beginning to ship our CT–2 handset to markets in Europe and in Asia, and I was very pleased to have Mr. Schelle upstage me on this a few moments ago. The CT–2 will, as he indicated, soon be available in the United States as well. This technology provides users with low-cost, high-quality cordless telephones that can be used in the office, at home, or outside these areas through base stations called telepoints. Similarly, the era of the Dick Tracy wristwatch communicator is now upon us. Motorola began shipping its wristwatch pager in the fourth quarter of last year. Motorola also unveiled last year IRIDIUM, a satellite system that will allow you to communicate from anywhere to anywhere on earth via portable handheld telephones. And as you might notice, Mr. Chairman, this IRIDIUM phone is about the size of our first portable cellular unit. IRIDIUM will provide a high-quality personal communication system to any area where installation of a land-based system is either impractical or uneconomical.

In addition to voice service, Motorola's vision of the future sees superior quality data, fax, and video services. Mr. Nagel amply demonstrated this a few moments ago with Apple's vision as well. These will all be provided through wireless modes of transmission. Our smart-car, smart-highway concept can be a reality and we can ease congestion on our highways, thereby reducing auto accidents. Rather than attempt to further describe orally the potential of the new wireless technologies, Mr. Chairman, I too have brought a short film that I would like to share with you.

Before I do, however, I have a few brief but critical points about this legislation. If these personal communication services and technologies are to reach their full potential, Motorola estimates that at least 300 megahertz of additional spectrum is needed now. This calculation is based on an assumption that technological advances will increase the efficiency of our use of spectrum by 25 to 50 times. This underscores the need for prompt passage of S. 218 and for the allocation of a significant chunk of the 200 megahertz proposed for reallocation to mobile and personal communications.

We know there will be fierce competition for the spectrum. We welcome the opportunity to make our case. We are encouraged by the administration's support for the reallocation of 200 megahertz with 30 megahertz to be available beginning in 1994. For the land mobile industry, 1994 could not come quickly enough.

Currently, as Director Cheramy just indicated, land mobile users of existing services are out of frequencies in major metropolitan areas such as Los Angeles, Chicago, and New York. Consequently we urge that the 15-year timespan for reallocating frequencies provided for in S. 218 be shortened. Already Europe and Japan have allocated or intend to allocate as much as 600 megahertz of additional spectrum to new mobile services such as CT–2, PCN, digital trunking, and digital cellular. If U.S. industry is to remain competitive, as others have indicated, again quick and decisive action is needed to accommodate our spectrum needs.

The key to its usefulness, however, is where the spectrum is located. For our industry lower is better but below three gigahertz is essential. Indeed bands of spectrum below three gigahertz currently held by the U.S. Government are integral to the new land mobile allocations already made in Europe and Japan.

We are further encouraged Mr. Chairman by the FCC's notice of inquiry and its spectrum reserve initiative for new, presumably, mobile technologies. We also commend the Commission for its attention to the needs of low earth mobile satellites above a gigahertz, such as IRIDIUM, in its further notice of inquiry on WARC.

Finally, Mr. Chairman, the administration as we've discussed earlier today has tied its support of this bill to the institution of a competitive bidding procedure for future assignments of spectrum. The concept of spectrum actions raises numerous concerns, some of which are detailed in my written statement. As you stated, Mr. Chairman, the reallocation of U.S. Government spectrum to nongovernment uses should not be held hostage to further debate on an untested and undefined complex assignment process. Time is short and additional spectrum is needed now. Consideration must also be given, we feel, to compensating existing users who might have to relocate as a result of any reallocation. We are concerned that a desire to find a quick fix for our budget deficit will outweigh consideration of whether such a procedure would truly be in the public interest.

Thank you, Mr. Chairman, and now for Motorola's vision of the year 2000.

[A brief video presentation was given.]

Ms. HAGGART. Mr. Chairman, basically the technology is available today to do what you just saw. It is the spectrum that is not. Thank you very much.

[The prepared statement of Ms. Haggart follows:]

PREPARED STATEMENT OF MS. VERONICA A. HAGGART

Mr. Chairman and Members of the Subcommittee, I am Veronica Haggart, Vice President and Director of Regulatory Affairs for Motorola Inc. We appreciate the opportunity to appear before you today to testify in support of S. 218, the Emerging Telecommunications Technologies Act of 1991.

Motorola is one of the world's leading providers of electronic and communications equipment, systems, components and services for worldwide markets. Key products include two-way radios, pagers, cellular telephones and systems, semiconductors, defense and aerospace electronics, automotive and industrial electronics, computers, data communications and information processing and handling equipment. We are proud to have been the recipient of the first Malcolm Baldrige National Quality award for our superior company-wide management of our quality processes.

We commend you, Mr. Chairman, and your colleagues for moving to identify and secure additional spectrum so that American consumers, industry and public safety can benefit from advanced telecommunications products and new services. As we indicated when we appeared before this Subcommittee last August, the link between spectrum availability and international competitiveness in new technologies is critical if we are to retain our leadership in land mobile and satellite communications, those technologies for which Motorola has pioneered the worldwide development.

Unless additional radio frequencies are allocated and allocated quickly, introduction of spectrum dependent technologies to the U.S. market will be seriously impeded. That would be very unfortunate because this is an arena where the U.S. now leads. Our policies to date have fostered the growth of world class success in such radio-based technologies as paging, two-way radio, cellular, data communications and wireless in-building networks. In particular, the FCC allocated spectrum for these services and, especially important, provided regulations that encouraged harmonious co-existence without mandatory standards. Today, we enjoy the very best of each of these, and we serve as a model for other countries eager to establish their own telecommunications industry and services.

While it is comforting to know that we have led to date, the challenge of the leader is to continue to lead. The competition has heated up as the world has come to recognize the benefits of a successful wireless communications industry for both industrial efficiency and as an export opportunity. According to the Department of Commerce, U.S. exports of radio communications equipment were $6.1 billion in 1990. But our leadership will be lost if we don't act expeditiously and decisively.

The world is now moving more and more toward a wireless society aided by the advent of new personal communications. With it has come a whole new litany of acronyms. Motorola's pocketsize MicroTAC cellular telephone, introduced exactly two years ago, was the first offering and it has sold like hotcakes all around the world. its popularity is not a passing fad. Now CT-2, PCN, PCS, IVHS and WIN are recent additions to any discussion of advanced wireless technologies. In addition, last year we unveiled IRIDIUM, Motorola's global communications system that will allow people to communicate from anywhere to anywhere on earth via portable subscriber units operating as part of a satellite-based system. The heart of IRIDIUM is a constellation of 77 satellites in low-earth orbit working together as a digital switched communications network in space. The system is capable of handling both voice and data. In short, we believe we are well on the way technologically to the decade of the 90's being the decade of wireless, or untethered, personal communications.

With the development of these exciting new personal communications products and services comes the requirement for additional radio spectrum. The need is critical. Motorola contends that the availability of new personal communications services will depend far less on technology than on spectrum availability. You and your colleagues have recognized this, Mr. Chairman, with this legislation. The Administration, too, has recognized it both in NTIA's recently released report on U.S. Spectrum Management Policy and in its support of legislation similar to S. 218—similar with one key distinction, namely the requirement for competitive-bidding, which I will address later. In addition, we are gratified that the FCC has recently launched such initiatives as the Notice of Inquiry on Personal Communications Services (General Docket No. 90-314) and the New Technology Reserve.

You are all to be commended. The key is: Will enough spectrum be made available and will it be made available soon enough?

SPECTRUM NEEDS: U.S. COMPETITIVENESS

Motorola, as a supplier of virtually every type of mobile radio technology, is uniquely qualified to address the spectrum requirements for the systems and services that will be in hot demand in the future. What Motorola means when it talks about spectrum needs for personal communications services is the combination of terrestrial Public, Private and Private/Shared services and low-earth orbiting Mobile Satellite Services which, taken together, will offer the user "ubiquitous, unlimited and untethered communications" for a wide variety of functions and will constitute the U.S.'s own unique brand of PCS. Based on our analysis, we believe there is an immediate need for at least 300 MHz of additional spectrum for terrestrial and satellite mobile services in order for the United States to continue to compete in these businesses and to stay in the forefront of the technology. Terrestrial service offerings will include dispatch, telephone interconnect, data, fax and video—all on a mobile basis—for user needs ranging from continent-to-continent global personal communications to campus or intra-office wireless PBX communications.

Low-earth orbiting satellite-based mobile communications systems of the future, such as IRIDIUM, will provide a high quality digital personal communications infrastructure to any area where installation of terrestrial systems is impractical or uneconomical. It will offer superior service at a lower cost than is possible over conventional geostationary mobile satellite systems. in the U.S. alone, as many as 10 million residents will continue to fall outside of the coverage of terrestrial mobile systems, not to mention the business and government communications that might originate or terminate in these unserved areas. Elsewhere in the world, where both landline and wireless infrastructure development lag far behind that of the U.S., the number of people not served is even greater. Low-earth orbit personal communications mobile satellite services offer a unique response to this thin-route demand, wherever it may exist.

As we indicated to this Subcommittee last year, other countries, notably the CEPT nations of Europe, as well as Japan, understand the significant spectrum needs for mobile services to meet the opportunities of the wireless personal communications future. Within CEPT there is broad agreement that mobile services will be primary between 1700 and 2450 MHz on a shared basis with other services except in a few bands where Space Operations will have primary exclusivity. Present users of this spectrum will be moved out as necessary. This provisional decision of CEPT is the apparent culmination of a series of intentional actions to allocate a large amount of spectrum to mobile services. it is true that CEPT countries have not yet finalized exactly where each new mobile service will be accommodated within the 1700- 2450 MHz band; but several specific steps have been taken already and they are most certainly irreversibly committed to take whatever additional steps are necessary to ensure that significant spectrum is made available for primary mobile use.

Like the European CEPT countries, Japan is also irreversibly committed to take whatever steps are necessary to ensure spectrum for mobile services. Japan has already allocated or plans to make available approximately 260 MHz of spectrum for radio LANS, private trunking, digital cellular and digital cordless phones in the near term. In fact, Motorola is currently selling trunked systems in the Japanese market at 1.5 GHz. However, this spectrum is not currently available for such systems in the U.S. By the end of the decade, as much as an additional 460 MHz will be made available for microcellular and other PCS future technologies to serve the Japanese market. Existing fixed services will be moved to higher frequencies or be replaced with fiber systems.

What happens if the U.S. does not act quickly enough to accommodate our existing and future spectrum needs? The answer is that we will cease to be competitive—from two perspectives: First, communications equipment suppliers, such as Motorola, won't be able to compete to provide the products and systems that will offer these services. Secondly, the myriad of industrial and public safety users who view communications as a vital tool to accomplish their business objectives will not benefit from the efficiencies that will be made possible by these services. In short, lack of spectrum will adversely affect, directly or indirectly, virtually every contributor to the U.S. GNP.

COMPETITIVE BIDDING

NTIA and the Commerce Department are to be commended for their recently issued report on U.S. Spectrum. Management Policy. It is a comprehensive compilation of information on a very complex subject. The conclusions and recommendations in several areas are useful. Other recommendations, at a minimum, are thought provoking in furtherance of the debate on certain controversial topics such as the auctioning of spectrum.

The report recommends the adoption of a competitive bidding procedure for future initial grants of spectrum to licensees. A recently introduced House bill, H.R. 1407, also entitled the Emerging Telecommunications Technologies Act of 1991, embodies this proposal and calls for its application to the assignment of U.S. government spectrum reallocated to non-US. government use. It further calls for identification of an initial 30 MHz of U.S. government spectrum (out of a total of 200 MHz) for transfer to non-Federal government use within 3-5 years pursuant to competitive bidding. Revenues collected would accrue to the general fund of the U.S. Treasury. The bill exempts numerous potential licensees based on public interest factors.

With respect to the 30 MHz "teaser", for a spectrum-starved industry such as ours, this is obviously an eye-catcher, and we are pleased to know that it could be made available beginning in 1994. But what spectrum are we talking about? Below 2 GHz or closer to 6? For the mobile communications industry, for the most part, current technology cannot make productive use of spectrum above 3 GHz. Bearing this in mind, how do we determine whether the Administration is prepared to auction off a Rembrandt- or a pig-in-a-poke?

We have previously expressed our concerns to this Subcommittee with respect to the concept of competitive bidding, or spectrum auctions. H.R. 1407 leaves many of our concerns unaddressed.

For example, competitive bidding would apply only to the assignment process—not to the allocation process. However, the bill goes on to say that one factor to be considered by the Commission in making allocation decisions among services subject to competitive bidding is the amount of revenue to be raised. Again, let's take the initial 30 MHz to be reallocated, which the bill states is to be assigned pursuant to auctions. Will the determination of how to apportion the 30 MHz among potential users be made based on potential revenue generation or the public need for various services? In short, is the user that might be the highest revenue generator necessarily consistent with what is in the public interest? Is revenue generation consistent with spurring innovation and new technologies?

In a related vein, the bill exempts several key users from the competitive bidding process and provides for further exemption if the FCC finds it to be in the public interest. Being exempted from any competitive bidding procedure should be of little comfort to the named users. As the public safety community recently pointed out in testimony before the House, an auction system would inevitably lead to less spectrum being made available for public safety as human nature would be to allocate more of available spectrum for non-exempt uses in order to maximize revenues. The sheriff of L.A. County further assumes that exempt groups, such as public safety, are excluded from vying for the initial 30 MHz since competitive bidding is required for their allocation.

Additionally, the Administration's proposal is silent on what rights should attach to auction winners. While it focuses on the use of auctions for initial grants and not license renewals, it does not address how long a successful bidder could hold a channel. Would transfer of spectrum ownership be permitted? If so, to whom? Would foreign ownership of spectrum be permitted? Could the use of the licensed spectrum be changed?

The Administration's bill also leaves to future notice and comment proceedings the critically important rules and procedures that would be followed for any competitive bidding procedure, including the method of bidding, basis for payment, and the like. The complexity of any such scheme was fully recognized in NTIA's report. The potential ramifications of spectrum auctions are too serious to authorize without first having thought through and developed detailed rules to determine if a workable process is realistic.

The reallocation of U.S. government spectrum and any further debate on the viability of a competitive bidding procedure for future spectrum assignments should proceed on wholly separate tracks. U.S. Industry and U.S. competitiveness will suffer if precious federal government radio spectrum, which could be made available for spectrum starved mobile radio users, were to be held hostage to such a complex experimental assignment process. Rather, it could have a dampening effect on technological advancement in a critical sector of our economy while not materially contributing to the long term resolution of the federal budget deficit.

Devising methods of raising revenue to address the Federal budget deficit—a very serious issue to Motorola—is one thing. As we understand it, the Administration's proposal does not address the key issue of compensating current users of spectrum who might have to relocate under any reallocation procedure.

The Administration has indicated a willingness to make 200 MHz of federal government spectrum available for reallocation to non-federal government use (some on a shared basis). It can be assumed that any eventual implementation will require relocation of existing government users or employment of alternative means of transmission (e.g. cable) to carry out their communications needs. Motorola is sympathetic to existing users and believes that every reasonable consideration must be given to minimize service disruption, to assure that service of comparable quality will be available and to provide recompense that is fair and equitable.

Finally, Chairman Sikes has recently proposed a schedule of user fees in order to defray the cost of services provided by the FCC (These revenues, unlike the funds generated by the proposal for auctions, would revert directly to the Commission). Motorola is more than willing to pay its fair share. However, all of the above revenue-related matters should be considered as this Subcommittee debates future policies in this area, and again, should be considered separately from the core issue of your bill—making federal government spectrum available for non-US. government use.

CONCLUSION

Mr. Chairman, thank you for the opportunity to express support for S. 218. The need for in excess of 300 MHz of additional spectrum for mobile or personal communications needs—whether by terrestrial or satellite-based means—is real. Demand is the driving force. Personal communications services are not a case of a technology in search of a market. The success of cellular and trunked SMR services, for example, reflects the needs of a broad spectrum of business, consumer and government users for mobile and portable services. Likewise, the demand for a communications system that will move information of all kinds to and from people and machines anywhere is driving the personal communications market.

As a technology driven company, Motorola is excited about the opportunities unfolding in the world of wireless communications. We are confident that, given adequate spectrum, the U.S. can continue to be the technology leader in this vital industry. As a U.S. manufacturer, Motorola is encouraged by the Congress' interest in assuring the most efficient use of this finite and valuable natural resource and by NTIA's and the FCC's recent initiatives. As a leading global competitor in wireless communications, Motorola welcomes the challenges that lie ahead. We are committed to taking the necessary steps to make S. 218 a reality as quickly as possible.

We urge the Congress, NTIA and the FCC to intensify efforts to make the necessary spectrum available to maintain U.S. technological leadership in mobile communications.

Senator INOUYE. I thank all of you very much. Several things have come through very clearly for me. With the exception of the auction concept, every witness supports the concept of the measure, and every witness has stated that this bill should have been passed yesterday. That being the case, I will now announce that we will attempt to have a markup before the end of this month. I will call upon my colleagues to determine whether it be possible and feasible to take this measure and pass it with the assurance that the Stevens' measure with the auction feature will be considered soon thereafter and be given the full treatment.

Accordingly, I am calling upon all witnesses and interested parties to submit any suggestions that any of you may have.

Mr. Cheramy, you have a few suggestions to make as to how this bill may be improved, amended, et cetera. I would hope that these suggestions can be received by the staff within 10 days.

Mr. Roos, I am going to be calling you yet, do not worry, but I thought we would make this announcement before we proceeded any further, so keeping that in mind I am pleased now to call upon our last witness, Mr. Roos.

STATEMENT OF CRAIG ROOS, EXECUTIVE VICE PRESIDENT, LOCAL AREA TELECOMMUNICATIONS, INC.

Mr. Roos. I'm sure the last would not be least here. Good afternoon, Mr. Chairman, ladies and gentlemen. My name is Craig Roos. I am executive vice president of Local Area Telecommunications in New York. I am also president of the our personal communications network subsidiary, PCN-One of New York, and I am the past president and current board member of ALTS, the Association of Local Telecommunication Service providers in the United States.

I am pleased to present today my support for S. 218 on behalf of LOCATE, and I am here to tell you that I am happy the communications networks are going to open up to some of these new and expanding technologies. We have an important job in front of us in assuming some leadership here to make sure that these new frequencies are made available.

A word about LOCATE. LOCATE was founded in 1981 to dedicate itself to pioneering key digital local access technologies, primarily by microwave radio. In 1981 we received a license from the FCC for digital termination services and were the only company, in fact, out of the all awardees and licensees who actually designed, engineered, and still operate today digital termination services.

From those early beginnings we became, over a period, a provider of high-speed microwave services in all common carrier bands in major markets, and today we are the largest single provider of digital microwave transmission services in the United States. Subsequently we have taken an advanced position in wireless personal communications networks, specifically being authorized under an experimental facility with the FCC, to provide personal communication services in the New York metropolitan area, and we are currently actively under extensive trials of propagation, interference and other related matters.

We believe PCN has the potential for revolutionizing the way that the United States brings communications to the end-user market. However, the time to act is now. LOCATE urges Congress to make it a priority by fine tuning S. 218 to include an immediate allocation of spectrum, specifically for PCN and other new services. Specifically, we would recommend that the S. 218 be amended to require the following:

The reallocation of spectrum to be available for personalized communication services including specifically PCN within 12 months of enactment of S. 218.

Second, to urge Congress to direct the FCC to develop the rules and procedures within a short period of time and after the enactment of this bill make sure that PCN licensees that are in the top markets in the United States are given out on an expedited basis.

We highly recommend a program of expedited and streamline comparative hearings which stress only the applicant's qualifications and pass history of performance on various FCC regulations. As such, LOCATE strongly opposes the position of the NTIA and others that believe that the spectrum should be allocated on an auction only basis. The Congress and FCC have spent seven long years of trying to promote competitive practices specifically in local distribution. LOCATE has been part of that process, as have many of the other local access providers.

Without this encouragement from Congress and from the FCC, an alternative way of communicating the local loop would not be possible today. Specifically, lower prices and new services have been a fact of life in the major metropolitan areas because of LOCATE and others like them in providing services in the high traffic urban markets. LOCATE would urge the Congress to reject the spectrum allocation part which specifies for auctions based on some of the following criteria:

We believe that it is a short-term solution for a long-term problem. This industry will require a long and protracted involvement involving many years of capital spending for large and small users alike. However, the NTIA's proposals of auctioning spectrum would, in effect, eliminate any meaningful competition in the local exchange facilities and in the wireless communications.

I would like to point out that it takes three to five years at a minimum to produce a positive cash flow in this business. It takes extensive capital investment and by the record even some of the Bell operating companies are still yet to achieve profitability; that is, in cellular.

More importantly, I think that industry leaders and as in Government we are faced with a tremendous leadership opportunity here. We have an opportunity to reëstablish the United States as a major factor in competitive telecommunications. The spectrum allocation is absolutely critical to doing this. We believe that a policy of long-term investment in productive facilities will result in new employment, new taxes on income and in employment, and are not opposed to any form of long term diligently sought after Federal taxes to be provided from the revenue base and/or subscribing base that we have. I would be happy to answer any questions you have, thank you.

Senator INOUYE. Thank you all very much. I asked the former panel their thoughts on spectrum fees. Do you have any views on that?

Mr. CHERAMY. Mr. Chairman, we would be opposed to spectrum fees if they related to income or revenue generated. We think that is counterproductive. We think there ought to be incentives for efficient use of the spectrum. A spectrum fee based upon the use of the bandwidth, the more you use the more you pay, we would support. In my testimony I suggested that if you bought 1 unit it would cost $1, 2 units would cost $3, and 10 units would cost $100, and it would provide the incentive for innovative companies like our own to maximize the use of the available spectrum and not let the large well-heeled companies hoard spectrum or use it in an inefficient manner.

Mr. ROOS. I would concur with IDB's remark here. I would add a willingness over time based on the profitability and return of invested assets of the facilities that are actually put in place of some type of a long-term user fee based incentive to the government.

Senator INOUYE. Miss Haggart.

Ms. HAGGART. Just one additional thought, Mr. Chairman. I believe user fees have been proposed by Chairman Sikes that would revert back to the FCC directly to allow additional staffing to perform a number of the functions that all of us might benefit from. That might be one additional consideration and might thereby make auctions unnecessary. The only other caution of any note I would make is that once the camel's nose gets under the tent, these fees might escalate and there would be a concern that this might inevitably stifle innovation especially by the small inventor.

Dr. GITTEN. I think fees that were structured to encourage efficient use of spectrum would probably be desirable. I am not sure how you would attach fees to use of spectrum for garage door openers or other general use pieces of the spectrum.

Senator INOUYE. From your testimony I would gather, then, all of you agree, then, at this point in time the spectrum is not being used efficiently?

Mr. CHERAMY. Yes. Both the governmental segment, which would be reallocated as part of S. 218 but also the existing radio frequency spectrum is not being used as effectively as it could be for existing applications, both in terms of use of the bandwidth which could be shrunk significantly already, and also the alternative of putting many things that are currently using the airwaves underground.

We have begun the use of fiber optic cable in our television transmissions to bring away baseball games, for example, back to the home cities. Up until this year such transmissions involved a 100-percent use of satellite spectrum. Beginning this year we are using fiber-optic technology to do the same thing, and we think those kinds of efficiencies of use by alternative means can also free up bandwidth that otherwise isn't available today.

Mr. ROOS. I would like to state that I believe there is some efficient use of the bandwidth. However, there are a number of companies, similar to the people who have testified today, that have over a period of years made significant advances in the digital microwave and fiber optic facilities. In relation to the microwave, some of our users are the most sophisticated in the world and have gained immeasurably over the last three or four years because of the advancements in the technology and the use of the spectrum thereof.

Senator INOUYE. What are your thoughts on placing restrictions on sales such as the one we are now employing for the sale of broadcast licenses?

Mr. ROOS. I believe that as a long-term provider of services, a qualified applicant that has gone through a expedited comparative hearing, is not generally interested in selling off what it feels is a very major potential for developing a business. I would feel that a year or two between any license transfer would be a minimum. However, I would add a caveat that for needs of increasing the productive capacity of the systems to be built, i.e. to take in new shareholders or incremental capital or joint venture partners should be excluded from that definition.

Dr. GITTEN. Sales might be a way of encouraging people who are inefficiently using radio spectrum to shift to other technologies or pieces of the spectrum which are more suitable to their application and that—allowing people who want the spectrum that they are using to compensate them for any shifts should be considered as a way of encouraging maximum use of available spectrum.

Senator INOUYE. Anything from Motorola?

Ms. HAGGART. Mr. Chairman, I think you have hit on a couple of things earlier. If under existing processes or new concepts it is desired to keep the speculator out, I think there are ways to address that.

Senator INOUYE. I thank all of you again and once again advise the group here that the record will remain open until the 21st of this month, that is 10 days from now. And I would urge all of you, if you do have suggestions to make, to submit them to the staff. I will confer with the chairman of the full committee to seek a markup of this measure on or before the 24th of this month. That is Wednesday. And so I intend to have this measure reported to the floor before the end of this month, with the understanding that the matter of auctions will be considered by the subcommittee at a later date. So, therefore, if I am successful in that we'll have a measure without the auction going through on phase one, and who knows, that may be the law of the land, so with that I thank all of you and look forward to continuing working with you to get this measure through.

[Whereupon, at 4 p.m., the hearing was adjourned.]

APPENDIX

PREPARED STATEMENT OF THE AIR TRANSPORT ASSOCIATION OF AMERICA

Chairman, the Air Transport Association of America (ATA) welcomes the opportunity to submit this statement to be included in the record of your hearing on S. 218, the Emerging Telecommunications Technologies Act. ATA member airlines collectively account for approximately 96 percent of all passenger and cargo traffic flown in the U.S. Our industry's commitment to the safety of the public is unwavering, and it is in the name of aviation safety that we submit these comments on S. 218.

ATA generally supports the goals of the Emerging Telecommunications Technologies Act, which seeks to identify unused, government-held radio spectrum to be designated for new commercial purposes. There are, however, some clarifications which need to be made in order to assure continued quality access to the spectrum for aviation safety purposes.

Commercial aviation uses radio spectrum allocation for a variety of safety-related communication purposes, Federal Air Regulation (FAR) 121.99 requires domestic and flag air carriers to maintain a constant, two-way air/ground radio communication system between each airplane and the appropriate company dispatch office which is separate and independent from the federal air traffic control system. in recent years, the FCC has defied the recommendations of the Federal Aviation Administration (FAA) and the National Transportation Safety Board (NTSB), as well as international radio accords which seek to establish a global spectrum designation dedicated solely for aeronautical purposes, by taking steps to force the aviation industry to share Its spectrum designation with other users.

The aeronautical spectrum designation is used for a variety of critical purposes which demand immediate and uninterrupted access to the system. For example, the United Airlines crew piloting the plane which crashed at the Sioux City, Iowa airport in 1989 used the system to communicate with the carrier's maintenance experts in San Francisco in an effort to solve a damaged hydraulic system problem. in other Instances, planes stuck in holding patterns due to weather conditions must first get company clearance to divert to another city before the FAA will allow a plane to alter its course and fly to an alternate airport. For a plane running low on fuel due to a circling pattern caused by fog or rain, such communication is vital.

Due to the requirements of FAR 121.99, the commercial airline industry has made significant investments in air-to-ground radio systems which will guarantee the operation of a communications system to Insure safe air travel. The sharing of the spectrum endangers the safety of the travelling public because competing signals on the spectrum may disrupt those air-to-ground communications. ATA hopes to resolve this problem through amendments to the legislation which preclude sharing In the electromagnetic spectrum allocated to aviation safety services. Because of the critical role radio communication plays In aviation safety, ATA also seeks to have the aviation community represented on the private sector advisory committee which will review the recommendations that will be submitted to Congress as the result of the pending legislation.

Mr. Chairman, we look forward to working with you and your subcommittee to insure that the aviation communications system remains an integral part of a safe air transport system.

PREPARED STATEMENT OF THE AMERICAN PUBLIC POWER ASSOCIATION

The American Public Power Association recognizes the importance of telecommunications to our society as well as the importance of fostering new telecommunications technologies. This desire to assist developing technologies, however, must not put the reliability of the electric services that Americans have come to rely on at risk. APPA is pleased that S. 218, the "Emerging Telecommunications Technologies Act of 1991," acknowledges the critical nature of reliable electric services with the inclusion of Section 4(c)(4).

APPA is the national service organization that represents more than 1,750 locally controlled public power systems across the country. Approximately 1,100 public power systems and rural electric cooperatives purchase power generated at 160 federal multipurpose water projects operated by the U.S. Army Corps of Engineers or the Bureau of Reclamation. Total federal hydropower generation is approximately 146 million megawatt-hours per year. This federal power is sold by the federal power marketing administrations (PMAs), which include the Southwestern Power Administration, the Western Area Power Administration, the Bonneville Power Administration, the Southeastern Power Administration, and the Alaska Power Administration.

The rates charged by the PMAs for the sale of hydropower are repaying the federal government—with interest—for the capital investment in the power generation features of the federal multipurpose water projects. The rates also recoup annual operation and maintenance expenses of the projects. Power customers also are repaying the bulk of the costs of the irrigation facilities associated with many of the multipurpose projects and for certain recreation and fish and wildlife measures associated with the projects. Therefore, anything that increases project expenses or affects power generation greatly concerns federal power customers.

The purpose of S. 218 is to identify 200 megahertz of radio spectrum below the 5 gigahertz level that can be reallocated from the National Telecommunications and Information Administration (NTIA), where it is used by federal government agencies, to the Federal Communications Commission (FCC) for licensing to non-federal users. It is true that S. 218 does not identify the NTIA-controlled spectrum to be reallocated, and it is true that certain criteria must be met by particular spectrum before it is reallocated to non-federal users. But, it also is true that the spectrum controlled by the NTIA which is the most attractive for assignment by the FCC to emerging technologies—the spectrum that is the most highly sought after—is the spectrum between 1710 and 1850 megahertz. This spectrum band currently is used by the federal power marketing administrations and the Tennessee Valley Authority (TVA) for fixed microwave operations.

APPA, therefore, is pleased that Section 4(c)(4) has been included in S. 218 to stop the withdrawal and reallocation of frequency assigned to or used by a federal power agency. This will not result in wasted frequency because S. 218 provides that federal power agency frequency is eligible for mixed use in geographically separate areas, which means other users who desire spectrum can be accommodated on the federal power agency frequency.

References in this statement to the "federal power agencies" mean Southwestern, Western Area, Bonneville, and TVA. Southeastern does not own any facilities to be affected by the legislation; the effect on Alaska will be minimal.

All of the spectrum between 1700 and 2300 megahertz is being sought by new users for new devices. The spectrum from 1710 to 1850 megahertz and 2200 to 2290 megahertz is controlled by the NTIA and licensed to federal government agencies. The remainder of the 1700-2300 megahertz band is licensed to non-federal users by the FCC. All of this spectrum is very heavily used for microwave communications by federal and non-federal electric utilities. Despite this, proponents of several emerging technologies want all of this spectrum—from 1700 to 2300—to be cleared of the current users and parcel led out to new technologies.

The microwave facilities used by the federal power agencies provide for the protective relaying of electric transmission systems, allow load control and data acquisition, are used to operate generation facilities such as plants and hydroelectric dams, and control and monitor numerous kinds of utility systems. For example, the Southwestern Power Administration microwave facilities operate, monitor, and control the power system in the Southwest Power Pool region, which includes 28 high voltage substations and 23 Army Corps of Engineers hydropower dams. Another example involves the Western Area Power Administration (WAPA) and Basin Electric Power Cooperative, headquartered in Bismarck, North Dakota. Through microwave, PAPA tells Basin Electric plants how much power to generate to meet WAPA customer needs.

The overriding concern with reallocation of spectrum used by the federal power agencies is the disastrous impact it could have on the reliability of the federal power agencies' telecommunications systems. The reliability of federal electric services and the safe operation of the federal power system depend on the reliability of the telecommunications systems available to the power agencies. Were the federal power agencies to be ordered off the 1710-1850 megahertz spectrum, the most critical problem would be the availability of equally reliable replacement spectrum for microwave operations.

A primary theme of S. 218 is that federal government users should rely on commercial carriers or other vendors to meet their telecommunications needs. This simply would not work for the federal power agencies because sufficiently reliable communications services might not be available from common carriers. Remote areas of the country may not be served by common carriers or the available common carrier networks may not provide the dedicated, highly reliable communications capabilities required for utility operations.

The requirement that utilities have reliable, private telecommunications systems has been demonstrated numerous times during natural disasters such as tornadoes, hurricanes, and earthquakes as well as accidents such as the Three Mile Island incident. During 1985 proceedings dealing with private microwave service rules, the FCC acknowledged this need for reliability when it found that "power companies demand a reliability factor of 99.995 percent * * * which is higher than the level of reliability for most common carrier services."

The federal power agencies must have communications systems under their complete control, available to them at all times, and free of the large volume of traffic carried by commercial vendors, particularly at a time of crises. In the interest of public health and safety, the federal power agencies and the utilities they supply electricity to cannot be put in the position of having to compete with the users of common carriers for services and system repairs.

Alternate technology such as satellite and fiber optics can supplement microwave facilities, but are not adequate wholesale replacements for microwave. Utilities have no control over the efficiency of satellite hub station operations or over the position and orientation of the satellite in space. The life expectancy of 5 to 7 years of most satellites does not serve reliability requirements. Furthermore, satellite transmissions are not always fast enough to be suitable for utility reliability.

Fiber optics cable is extremely expensive—estimated by one power agency at $7-$8 a foot or $40,000 a mile for the cable alone—and is susceptible to the same physical problems—cable cuts and fallen trees—that disrupt telephone services. The effect of outages can be lessened if the fiber optics cable is installed in a looped configuration—but this doubles the cost. However, if the fiber cable is not installed in a loop, an alternate system must be maintained to guard against an outage.

Assuming the federal power agencies were forced to move and assuming that new spectrum could be found for them, it would be at higher frequencies. The higher spectrum has less favorable propagation characteristics and is particularly susceptible to interference from rain and fog. Moving to higher spectrum could require more sites and more equipment to cover the same distance covered today. If additional sites were needed, property rights to those sites also would have to be acquired.

Moving would be expensive. Planning and design costs for new systems would be incurred; equipment would have to be replaced or modified. New sites and attendant property rights might be needed. By law, the ratepayer customers who buy electricity from the federal power agencies would bear the responsibility exclusively for paying all of the costs associated with those agencies' having to move to new spectrum. This would be inequitable. The ratepayers already have paid for the highly efficient telecommunications systems that would be scuttled in favor of commercial vendors.

In light of the critical use of spectrum by the federal power agencies, it is appropriate to exempt them from the effects of the bill. Providing in Section 4(c)(4) that spectrum assigned to or used by the federal power agencies cannot be withdrawn and reallocated to the FCC properly protects the 38 million American homes and businesses that depend on federal power by protecting the reliability of the communications systems that the federal power agencies depend on to provide efficient, safe electric services. Risking the reliability of the federal power agencies' communications systems so that commercial vendors can grab that spectrum is unwise and unnecessary.

Section 4(c)(4) is not an exclusive exemption, however, as it provides for mixed use of the federal power agency spectrum in geographically separate areas. This means that other users who desire spectrum can be accommodated. This is an acceptable and desirable solution.

Were the decision to be made to take the.spectrum now assigned to the federal power agencies because of the intense pressure to claim the spectrum from 1700 to 2300 megahertz for new technologies, the continued reliability of the federal power agencies' communications systems and equity for federal ratepayers would have to be assured. The following minimum provisions would be necessary to meet those objectives:

- the NTIA would have to locate new spectrum for use by the power agencies that is as reliable as the spectrum now assigned to those agencies before the current spectrum assignments could be withdrawn;

- the power agencies would have to be satisfied of the reliability of operating on the new spectrum before the current spectrum assignments could be withdrawn;
- the power agencies would have to be allowed to continue controlling and operating their own telecommunications equipment rather than having to rely on private contractors;
- an adequate amount of time would have to be provided to the federal power agencies to allow for such activities as planning and design of new microwave systems, development of equipment if necessary, acquisition or modification of equipment and sites as necessary, installation and testing of equipment; and
- a system would have to be designed by which to finance all of the costs associated with the federal power agencies' moving to new spectrum so that ratepayers would not incur those expenses. Preferably, the system would be designed so that taxpayers would not bear the costs either.

The approach that Section 4(c)(4) of S. 218 takes is the preferable solution to the vexing problems raised by reallocating the spectrum used by the federal power agencies.

PREPARED STATEMENT OF MR. LLOYD A. BAKER

My name is Lloyd Baker. I am testifying today on behalf of the Alarm Industry Communications Committee, which is comprised of the national associations that represent the equipment manufacturers, dealers and installers of alarm systems that protect the safety of life and property. We wish to express our support for S. 218, which would transfer some 200 MHz of badly needed spectrum from government users to non-government users. We respectfully urge the Committee to include the needs of the alarm industry in its Committee Report accompanying S. 218 and to instruct the FCC to consider our needs for a portion of the spectrum to be allocated to alarm services. We also respectfully request the Committee to include representatives of the alarm industry on the Spectrum Advisory Committee to be established by the Secretary of Commerce. Finally, we wish to express our opposition to any proposal which would result in the auctioning of portions of the spectrum to industry.

Since time immemorial, people have taken measures to safeguard their lives and property from the dangers of fire and theft, to detect the occurrence of such events and to summon aid. Although the methods employed over the years have changed, the concept has not.

The fundamental activity of the alarm industry is the manufacture, installation and remote monitoring of sensor devices at the protected premises. When a sensor device detects the occurrence of the event for which it was designed, such as the presence of smoke or the motion of an intruder, an alarm signal is generated that may be audible on the premises but also is transmitted electronically to an alarm company. The alarm company, in turn, alerts the police or fire department.

It has been estimated that 12,000 burglaries take place each day in the United States. Increasingly, people are placing more reliance on the alarm industry, in the form of monitored alarm systems, to combat this threat. Americans now spend nearly $2 million per day on security systems, not only for businesses but for residences as well. In addition, the federal government is one of the largest customers of the alarm industry.

The alarm industry has two distinct needs for spectrum. One is to allow us to bypass the monopoly control of the local wire in order to transmit our alarm signals from the home or business to the monitoring center. The second is to allow our sensor devices within the home or business to send very low power signals to a centrally located panel on the premises. The first issue I would like to 'address is long-range alarm signalling.

Usually an alarm signal goes from the home or business to the alarm company by means of a telephone wire. This makes us totally dependent on the telephone companies to provide our alarm monitoring service. There are three reasons why the alarm industry would like to replace or supplement this telephone wirelink with radio-based communications:

1. *The telephone wire-link is susceptible to failure.* The failure may be deliberately induced by criminals who may find and cut the telephone line. Or the failure may be inadvertent, caused, for example, by a severe storm. But in both cases, the premises become unprotected. A radio-based link, either as the primary connection between the premises and the alarm company or as a back-up to the telephone wire-link, would ameliorate this situation.
2. *The alarm company has no control over maintenance of the telephone wire-link.* If the telephone wire-link fails or is cut, the alarm company must depend upon the

telephone company to repair it. We believe that this critical connection between the premises and the alarm company should be under the control of the alarm company, not a third party.

3. *The alarm company has no control over the cost of the telephone wire-link.* An alarm company ought to be able to control its recurring costs. Instead, statistics show that the telephone line charges borne by the alarm companies and their customers have steadily increased. This places a vital component of the alarm company's recurring costs under the control of a third party. Worse, some telephone companies have taken steps to become competitors in the alarm business. In any market where this happens, the alarm companies are at a distinct disadvantage. We become subject to anticompetitive facilities installation and pricing practices on the part of the competing telephone company.

The reason why the alarm industry has not already begun to replace or supplement the telephone wire-link is that there is no radio spectrum specifically dedicated to the alarm industry to support radio-based communications. The alarm industry must compete with all other private users of spectrum. Unfortunately, the spectrum allocated by the FCC for private, non-mobile uses, is saturated. Thus we cannot assure continuous, secure transmission of alarm signals by radio today due to the lack of dedicated spectrum. As a result, when you are protecting life and property, the use of radio communications from the home or business to the monitoring center is unavailable and would place lives and property at risk.

The second issue I would like to address is spectrum for alarm sensors. The alarm sensors within a home or business need to communicate the detection of a fire or intruder to an alarm processing center within the premises. More and more of these devices are using small, battery powered radio transmitters to communicate with the processing center. Such wireless sensors are low in cost, which puts the price of a security system within the reach of most families and businesses. These battery powered sensors communicate with a receiver at a panel that is centrally located on the premises. The panel generally exchanges information with the various sensors installed throughout the premises. It ascertains, for example, the state of the batteries installed in the sensors. The panel contains an automatic telephone dialing device and sends status reports or emergency signals to the alarm company. The alarm industry's wireless sensor devices that perform these functions transmit their radio signals at very low power levels. They are regulated under Part 15 of the FCC's rules.

The FCC's rules give no priority to such sensor devices: they must accept interference from the licensed services as well as from other Part 15 devices and they may not cause interference to licensed services. However, the alarm industry's low-powered devices are too important to continue to operate at sufferance. Moreover, as battery technology improves and low powered radio devices in other industries proliferate, there will be increased interference to the vital operations of alarm sensors.

The time has come for dedicating a portion of the spectrum to the alarm industry's sensor devices. Recently, the National Telecommunications and Information Administration released its report on U.S. spectrum management policy (NTIA Special Publication 91-23). In Appendix C thereto, in response to the alarm industry's concerns, NTIA recommended:

Specifying frequencies for at least some nonlicensed devices could be desirable *if spectrum were available* and if a need for special protection of a particular device can be demonstrated to be in the public interest. (Emphasis added.)

The alarm industry's sensor devices clearly warrant special consideration because they are used in the protection of life safety and property. The missing ingredient is available spectrum.

Accordingly, the alarm industry requests the Committee to take note of the industry's need for spectrum in its report and to instruct the Federal Communications Commission to consider the alarm industry's needs in any allocation of this spectrum it might make. The alarm industry further requests that the Committee instruct the FCC to put representatives of our industry on the Spectrum Advisory Committee, which will be convened by the Secretary of Commerce pursuant to this legislation.

Finally we wish to voice our opposition to any proposal which involves the distribution of spectrum by auction. While there are some large, nationwide, alarm companies, the industry is comprised mostly of numerous small local companies. The industry is too fragmented for any one company to mount a successful bid at auction. Efforts to create a bidding consortium may well violate the antitrust laws. Consequently, the auction process would nearly certainly leave the alarm industry without the spectrum it so desperately needs.

Furthermore, the goal of auctions is to enhance the U.S. Treasury. Yet this source of funds may not be as lucrative as it might appear. For instance, we understand that the experience in New Zealand in spectrum auctions has been that auctions have produced only 10 percent of the anticipated revenues. Also, if a licensee obtains spectrum by auction, this spectrum becomes a tangible asset, the cost of which is deductible. Thus the revenue to the Federal Government from the auction of spectrum would be reduced by 34 percent because of the tax deduction taken by the purchaser.

Auctions may also pose potential adverse effects on commerce. For instance, the auctioned spectrum may be used for one purpose in one market and another purpose in another market. There would be no nationwide standardization of frequency use. Equipment would virtually have to be custom designed for each market, depriving the licensees of the economies of scale of mass production. The higher cost of equipment, in turn, would take a greater percentage of capital available to start a business, resulting ultimately in a less robust communications industry.

Thank you for this opportunity to address the Committee. We would be pleased to provide any additional information the Committee may desire.

PREPARED STATEMENT OF MR. STEVEN BISHOP, CHIEF OF POLICE, KANSAS CITY, MO

My name is Steven Bishop and I am Chief of Police for the Kansas City, Missouri Police Department and a spokesman for the Major Cities Police Chiefs Association, an organization of the International Association of Chiefs of Police (IACP). I thank you for giving us the opportunity to share our thoughts with you on an issue of great importance.

I sincerely regret that a schedule conflict precludes my presence in Washington this afternoon, but I am sure that Deputy Director Jack Carmody of the Florida Highway Patrol will convey my sentiments to you. It is my hope that my remarks and those of IACP Communications Committee Chairman Harlin McEwen, Chief of Police for Ithaca, New York, will be admitted into the record of this hearing.

The Major Cities Chiefs Association is an organization formed within IACP to devote its specific attention to law enforcement and public safety matters in the nation's most populous metropolitan areas.

I would like to emphasize that in joining with the Associated Public-Safety Communications Officers (APCO) in this presentation, it is not only law enforcement operations for which we have spectrum concerns, but all types of public safety operations.

S. 218 addresses one of the most serious problems currently facing the elected and appointed officials whose role it is to maintain order and enhance the safety of the public in those areas; the rapidly dwindling of spectrum resources which are necessary for the command and control of our state and local government employees and systems who have the statutory authority and responsibility to protect our people and their property and to respond to calls for emergency assistance from them.

IACP and the Major Chiefs organization have repeatedly passed resolutions at their annual conferences supporting the efforts of APCO in beseeching the Federal Communications Commission to heed the 1983 Congressional directive by providing adequate spectrum for state and local government operations.

We appreciate the changes which were made as this bill was reintroduced this year by Chairman Hollings and Chairman Inouye, as a result of the testimony from public safety representatives last year. The changes give greatly increased recognition to the requirements of the public safety community. This will help in the long run and, hopefully, will spur the FCC to take action on its own in the short run, as directed previously by Congress.

S. 218 alone will not resolve the spectrum shortages of public safety. The state and local government agencies of the country serve as the first responders to the calls for emergency help from the citizens and countless lives hang in the balance each year as the law enforcement, fire and emergency medical services race to respond to these calls. New technology is opening the opportunity for us to use new and improved communications tools, but each technological development will require its own complement of new radio channels, particularly in the heavily populated fast- changing, mobile environments in which we operate.

Unlike other sectors of our society who look towards S. 218 providing new spectrum for new economic growth, the public safety community does not anticipate any financial rewards from the spectrum it seeks. What we do look toward is an opportunity to save lives and property of our citizens, using the latest possible communications technology.

Chairman Inouye asked last year whether the lack of spectrum for public safety purposes had reached a "crisis" stage. The answer was a definite "yes" in the major cities last year, and it is an even more emphatic "yes" again this year. Mr. Chairman, the situation will get increasingly worse until something is done about it.

The historic mobile radio frequency allocation practices of the Commission have, by and large, and for administrative convenience, consisted of marking nationwide "blocks" of frequencies for specific purposes. This has been appropriate in many instances. However, today's urgent public safety spectrum requirements in the major cities warrant a different approach.

All sections of the country do not require the same amount of public safety spectrum. Today's major public safety spectrum shortfalls are in the major cities. What may be an "adequate" amount of spectrum for a state like Montana or a city like Anchorage falls far short of the most basic needs for the New York Metropolitan Area, or the Southern California, Southern Florida, or Chicago Metropolitan areas. Public safety spectrum needs are directly related to where our people live.

The needs of the major cities for spectrum are past being urgent. They cry out for immediate resolution. Steps to ease this situation for the larger metropolitan areas must be taken now by the Federal Communications Commission while the beneficial results of S. 218 are realized through the measured pace of the legislation.

There are also several other key spectrum issues now before Congress.

The Members of Congress know only too well of the serious financial situations our state and local governments are in. The local governments cannot possibly compete with the commercial sector in bidding for the use of the spectrum, and must be provided the radio channels they need outside of any spectrum auctioning procedures. They must be similarly insulated from any spectrum "user fees".

Also apparently at peril is the continued use by the state and local governments of the microwave spectrum, which houses their backbone communications systems. There are many millions (perhaps billions) of dollars of taxpayer money tied up in these systems in the 2 gigahertz band alone. Congress cannot allow this enormous investment to be wasted through FCC reallocation proceedings.

The public safety agencies of the country need all of the tools that technology can provide them. We collectively and respectfully ask that Congress steer the Federal agencies participating in the implementation of S. 218 in the direction of assisting meaningfully in getting those tools in our hands.

PREPARED STATEMENT OF MR. ROBERT M. HARRIS, NATIONAL TELEPHONE COOPERATIVE ASSOCIATION

Mr. Chairman and members of the Subcommittee. My name is Robert Harris. I am the Manager of Eastern New Mexico Rural Telephone Cooperative in Clovis, New Mexico. I am submitting testimony on behalf of the National Telephone Cooperative Association (NTCA), which is a national trade association representing almost small, independent telephone systems throughout rural America. I and many other NTCA members use radio frequencies to provide communications services to our subscribers. Radio is a critical component of our telecommunications network.

We applaud your efforts as embodied in S. 218, the "Emerging Telecommunications Technologies Act of 1991," to free up federal government spectrum for commercial use.

BACKGROUND

In 1986 the Federal Communications Commission proposed legislation authorizing the sale of non-mass media radio spectrum. In October, 1986 the House Energy and Commerce subcommittee on Telecommunications and Finance held a hearing on auctions, but no action was taken.

From 1987 on, the auction proposal has appeared in the President's budget under both the Reagan and Bush Administrations. Each time the plan was to sell non-mass media radio licenses to the highest bidders.

The current FY 1992 budget proposal appears to anticipate auctions as a component of your legislation to free-up federal government spectrum. Although the budget proposal is silent on which licenses would be auctioned, history has shown that the non-mass media licenses have been targeted for auctions.

Congress has for the past several years wisely rejected auction proposals and we hope you continue to do so. Auctions should not be included in S. 218.

THE USE OF AUCTIONS TO ASSIGN SPECTRUM IS CONTRARY TO NATIONAL POLICIES AND THE PUBLIC INTEREST

The market system of assigning spectrum contemplates the use of auctions in which this limited natural resource would be awarded to the highest bidder. Supporters of this system argue that users would employ spectrum efficiently under the auction scheme because they would be paying for it. This argument overlooks some important considerations inherent in the national policy as expressed in the Communications Act of 1934. One of the purposes of the Act is to assure universal service, i.e., "to make available so far as possible to *all* the people of the United States a rapid, efficient, nationwide and world-wide wire, and radio communication service with adequate facilities at reasonable charges * * *" 47 U.S.C., Sec. 151 (emphasis added). Policy makers need to be constantly vigilant to assure that this goal applies equally to rural America. The public policy contained in the Communications Act is also reflected in the Rural Electrification Act of 1936. The RE Act, Section 1, 7 U.S.C., Sec. 921, specifically articulates the universal service goal for rural America in a declaration of policy designed to "assure the availability of adequate telephone service to the widest practicable number of rural users of such service." Both the FCC and the REA have supported these mandated national goals by enacting rules, regulations and policies which have generally promoted the provision of telecommunications services to our counts rural subscribers. With respect to the allocation of the radio frequency spectrum, FCC policies have enabled small carriers to obtain licenses to use frequency spectrum for rural telecommunications services. Under existing procedures, small telephone companies like E.N.M.R., have, for the most part, been able to obtain the necessary radio licenses and build the necessary network facilities to fulfill their common carrier obligations. Our cooperative holds licenses in a number of radio services. We provide Basic Exchange Telecommunications Radio Service (BETRS). BETRS connects remote subscribers to a central office, where the terrain and distances are such that the cost of conventional wire facilities between their homes and the central office would be prohibitive. We also provide Improved Mobile Telephone Service (IMTS) which connects mobile subscribers to the central office and each other. The service predates cellular and is used in some of our more sparsely-settled areas where cell sites are not practical at this point in time. In addition, we are involved in a cellular partnership and provide that service as well. We also utilize point-to-point microwave radio to provide service. Point-to-point services are used to connect a group of subscribers with a central office and to interconnect our central office with those of other telephone companies so that our rural subscribers can reach anyone in the United States and the world. Microwave radio is an invaluable service because it is a more cost effective method of construction than wire in many rural applications. This keeps telephone rates reasonable. Finally, we use maintenance radio, which is a two-way mobile radio service that enables us to communicate rapidly and efficiently with our employees. It is critical in remote areas to be able to contact, for example, a linesperson, who must cover a vast territory, and get him or her to a site where repairs, maintenance or construction is needed. In addition, we are taking a good close look at new radio technologies as well.

If the ability to provide our current services and the ability to compete for licenses for new services is lost because spectrum is auctioned off to the highest bidder, the availability of adequate telephone service to the widest practicable number of rural users would be reduced. This is the case because the "deep pockets" able to bid the highest price would not make service the top priority the way a small company entrenched in the community would. In a crunch, the deep pocket interests would invest in the lucrative markets while they hold on to less lucrative licenses in rural areas. They would therefore have to sacrifice universal service in the interest of maximizing their profit margins.

NTCA believes that a market-based spectrum-assignment system would be both unfair and inefficient. Rewarding radio licenses to the highest bidder would, in most instances, eliminate from the process small telephone companies franchised to provide various telecommunications services in rural and low density areas throughout the country. Auctions would allow large firms with plentiful resources to outbid small companies, with fewer resources, but who are committed to service in these areas over a long period of time and under difficult circumstances. Rural companies need radio licenses in order to provide adequate basic telecommunications services, including personal communications services and other new services that may require spectrum. If the big money players are allowed to buy up the spectrum, small carriers and the communities they serve would be left vulnerable to the possibility of not being able to provide the complete modern and efficient service we now provide by interfacing wire and radio systems. Under an auction scenario, the small telcos would be left with the least desirable portions of networks constructed to provide service to our rural communities. This potential indicates that a bidding system will result not only in unfairness, but in efficiencies and stranded investments, or worse yet, the abandonment of service to less lucrative rural areas. The abandonment of service to rural America is inconsistent with the Communications Act, the Rural Electrification Act and the national interest.

spectrum management policy. While the [illegible] cated spectrum are best discussed after reallocation [illegible] supports the proposal put forth in S. 218 to [illegible] re-allocate such bands in a thoughtful fashion [illegible] spectrum allocation is particularly important [illegible] trum more intensively than any other [illegible] services of significant scope can be [illegible] user has been evicted. This unfortunate [illegible] ment must be careful in selecting what [illegible] it must give careful thought to how [illegible] how to allocate is a different issue. [illegible] deserved should not be hastily [illegible]

McCaw is aware that many [illegible] spectrum allocation has been unduly [illegible] rent experience that frequency allocation [illegible] the tortured history of cellular is a [illegible]

Even so, McCaw believes that the [illegible] bill sets forth an orderly reallocation [illegible] as most of new services live up to [illegible] in the United Kingdom as a new [illegible] mass market support soon after [illegible] technology, has now been available [illegible] tion has been lukewarm: there are [illegible] today as there are telepoint [illegible]

Personal communications [illegible] Kingdom as another form of [illegible] has been widely publicized [illegible] services. However, the [illegible]

[illegible]

in office settings and at home. They will also want wireless data communications for their portable computers, facsimile terminals, and even video terminals.

Cellular and other advanced wireless services offer a revolution in the way people conduct their daily lives. It is these technologies that will transform the way in which people work and the way in which they play. Such technologies offer increased convenience for users and increased productivity for the nation. These are benefits we are already seeing from today's cellular service.

Cellular carriers are vitally interested in offering these new wireless services in connection with existing mobile telephone service. In order to meet evolving subscriber demand, cellular carriers are committed to providing a full array of wireless services and to delivering such services conveniently and efficiently, integrating whatever spectrum and access technologies that are available. Several cellular operators are currently testing new technologies in an effort to assess whether additional services (such as enhanced data communications or telepoint services) can be offered in the radio frequencies they have already been licensed to use. McCaw, for example, is conducting experiments to determine whether a high-density microcellular system—such as a wireless office PBX—can be operated on the same frequencies as existing cellular systems without compromising the quality of basic cellular service. At the same time, cellular operators and their affiliates are trying to assess whether particular wireless services—such as data transmission services can be offered more efficiently and reliably on separate spectrum assignments.

The challenge currently facing McCaw and other cellular providers is to utilize its 25 MHz allocation efficiently, so that we can accommodate new subscribers without suffering any decline in the quality of service. So far, carriers have met this challenge by implementing aggressive programs to build additional cell sites in order to increase capacity and to improve coverage. Because the cellular industry has succeeded in satisfying demand so far, growth in cellular usage continues to be robust. However, several of the large urban systems are approaching the capacity ceiling of existing analog technology. Fortunately, the industry foresaw this problem several years ago. Cellular carriers have developed digital technology standards that will enable them to treble the capacity of their radio channels in the next year or two, and then to achieve a six-to-seven fold increase in system capacity. McCaw and other cellular carriers are also looking at even more sophisticated digital access protocols, which could support capacity enhancements on the order of ten to twenty times current limits.

These improvements in system capacity bode well for the cellular industry's ability to meet anticipated demand for voice communications from vehicular and pedestrian users. However, cellular's continued success in responding to such demand will actually generate further demand for new communications services that can be offered on a wireless basis. Users of portable and lap-top computers now want the ability to network with other computers while travelling; businesses are increasingly interested in using wireless technology to monitor inventory and report transactions in the field; and office workers are intrigued by the prospect that they will be able to carry their phones with them, as opposed to being tied down to their desks when they need to make or receive calls. As today's cellular systems familiarize the public with the convenience of wireless communications and as more subscribers sign up for service, the opportunity and demand for complementary service applications will quickly develop. This demand will add to the pressure for the allocation of more spectrum for wireless communication services.

Ultimately, additional spectrum must be opened up to meet the demand for the entire range of wireless services. The true potential of wireless communications cannot be realized unless customers can access complementary services with one handset as opposed to having to shuffle from a cellular phone, to a wireless office phone, to a PCN phone. If McCaw and others are to be truly more than a cellular competitor and be allowed to effectively bring about a universal, seamless, wireless complement to the wired network, we must be given the tools to do so.

Foremost among those tools is additional spectrum.

It is too early to say what the proper mix of personal communications services should be; or how much new spectrum will ultimately be required to meet the demand for these services; or what bands should be allocated for such services in order to promote service integration and efficiency. It is too early even to assess the relative merits of allocating spectrum to land mobile versus satellite services, or HDN, or any number of new spectrum-dependent services that will inevitably be proposed. However, it is clear that new spectrum allocations of some degree will be required to satisfy the burgeoning demand for new radio-frequency services. S. 218 goes a long way towards meeting these demands.

S. 218 recognizes that the process of identifying suitable bands for new technologies should begin now. This is a critical first step toward establishing a rational spectrum management policy. While the issues relating to licensing of the reallocated spectrum are best discussed after reallocation has been authorized, McCaw supports the proposal put forth in S. 218 to require the FCC to prepare a plan to re-allocate such bands in a thoughtful fashion, over time. A prudent approach to spectrum allocation is particularly important in the United States, which uses spectrum more intensively than any other country in the world. No new radio-based service of significant scope can be launched in the U.S. until an existing spectrum user has been evicted. This unfortunate dilemma indicates not only that the government must be careful in selecting what bands of spectrum to free up, but also that it must give careful thought to how newly-vacated spectrum should be reassigned; how to allocate is a different issue. Frequency bands that have been laboriously cleared should not be hastily recommitted to the first candidates that come to hand.

McCaw is aware that many proponents of new services worry that the process of spectrum allocation has been unduly time-consuming in the past. We know from direct experience that frequency allocations have sometimes been unduly protracted: the tortured history of cellular is a classic example of that.

Even so, McCaw believes that the procedures set forth in S. 218 are justified. The bill sets forth an orderly reallocation process; it may take time, but this is important as not all new services live up to their advance publicity. Telepoint was heralded in the United Kingdom as a new wireless communication service that would enlist mass market support soon after it was deployed. That service, which utilizes CT-2 technology, has now been available for approximately a year. Yet the public reception has been lukewarm: there are as many base stations in the United Kingdom today as there are telepoint subscribers.

Personal communications networks (PCNs) have also been licensed in the United Kingdom as another form of mass market wireless communication service. They too have been widely publicized as the next generation in personal communications services. However, the three ventures that were granted PCN licenses by the United Kingdom recently determined that they could not individually afford to provide service throughout the entire country as originally contemplated. They have accordingly proposed to divide up the rural and suburban areas of Britain among themselves in order to defer expensive infrastructure investments. Proponents of PCNs have advocated a prompt spectrum allocation for similar services in this country, but there is a serious question as to whether such systems, which require thousands of base stations to serve a single market area, would be economically viable given the relatively sparse population densities that exist in many parts of our country.

The experiments that are being conducted today by cellular carriers and others into the technical characteristics and market potential of PCNs and other new services will provide valuable background information to the Commission on formulating an appropriate spectrum reallocation plan. McCaw believes that such a plan should recognize that national interests are served not only by increasing the number of providers of wireless communications services, but also by ensuring that the widest possible array of complementary wireless communications services is made available to the public. The country's telecommunications infrastructure will be served best if national spectrum management policies promote the integration of as many services as possible, so that customers will be able to access the maximum range of services such as vehicular cellular service, wireless PBX service, and wireless data services from one lightweight handset, as opposed to having to acquire separate handsets for each service. The provision in S. 218 for a considered approach to spectrum reallocation provides a much needed mechanism to ensure that this coordination of wireless communications services can be achieved.

Some parties interested in the spectrum reallocation process have argued, even in the context of S. 218, that market-based approaches to spectrum licensing, such as auctions, provide the most expeditious means of making spectrum available for the development of new communications services. As an initial matter, McCaw believes that the focus of S. 218 should remain on reallocation of government spectrum, not on how that spectrum is ultimately licensed. Further, McCaw cannot support such an approach if it leads to uncoordinated allocations that do not serve the public interest.

Auctions raise several serious policy questions that spectrum managers must confront. As a spectrum allocation device, auctioning raises the likelihood that frequency will be granted for new services on an uncoordinated basis, making the integration of those services technologically more expensive and more cumbersome for the customer. As a device to assign spectrum for a new service, auctioning disregards the merits of a specific candidate's proposals and assumes that those who can afford to pay the greatest amount will actually use spectrum most efficiently. This is not always the case, particularly when the applicants include existing spectrum users who have already committed many of their resources to improving the systems they currently operate.

Finally, spectrum auctioning may serve only to encourage speculators to enter the market in the hope of acquiring radio frequency which they can warehouse and resell later for a profit. As McCaw can attest, the cellular industry has suffered considerably from the bane of license speculation. Cellular carriers have had to spend considerable sums to acquire cellular licenses from lottery winners, a large percentage of whom never actually expected to construct and manage cellular systems on a long-term basis.

McCaw applauds the bill's authors in detailing a careful plan for release and reallocation of new spectrum. At the same time we would caution that the assignment of newly-available spectrum must be thought through carefully, provide for growth, and make use of the most efficient forms of technology so that this valuable and precious national resource is not wasted. The process to allocate spectrum needs to be fair and equitable, and done in a manner to ensure it will not fall prey to speculators. In this way we can be assured that the public interest will indeed best be served.

PREPARED STATEMENT OF MR. HARLIN MCEWEN, CHIEF OF POLICE, ITHACA, NY

My name is Harlin McEwen and I am Chief of Police for the City of Ithaca, New York. I am Chairman of the Communications Committee of the International Association of Chiefs of Police (IACP) and I am a member of the Law Enforcement Committee of the Associated Public Safety Communications Officers (APCO).

I respectfully ask that this Committee receive this statement for the record of this hearing, in support of the testimony of Deputy Director Jack Carmody of the Florida Highway Patrol and the statement of Kansas City, Missouri, Police Chief Steven Bishop.

As a long-standing member of both IACP and APCO, I would like to congratulate Chairman Hollings and Chairman Inouye, the Members of this Committee and the Cosponsors of S. 218, for their efforts in putting together a bill which will be of benefit to the users of the radio frequency spectrum in particular and to the citizens of the United States in general.

I am particularly grateful for the changes in the bill from S. 2904 in the previous Congress which reflect the concerns of the state and local government public safety agencies. As introduced this year, S. 218 reflects the legislation enacted in recent years which draws attention to the spectrum needs of the state and local government public safety community.

S. 218 is a good bill and deserves the support of all members of Congress. It is an important step forward. It recognizes the needs of the country to take an in-depth look at the way the radio spectrum is being used by the Federal government; takes a measured step toward identifying areas of the spectrum which might better be used in the public interest; and establishes sound procedures for reallocating the spaces so identified.

One of the principal roles of government at all levels is to provide for the public safety of the population. Except for the national defense responsibilities of the Federal government, the protection of lives and property in the United States is largely a function of state and local governments.

The state and local governments are being increasingly burdened in their attempts to provide for the public safety of the citizens and their property. In this pursuit, they require the highest degree of support from the Congress and from all departments and agencies of the Federal Government.

We are pleased that S. 218 recognizes the spectrum support that is required to keep the public safety agencies functioning and to enhance their services. We trust that the Congress will specifically impress this Federal responsibility on the Federal agencies that are being called on to carry out the legislation, as well as in connection with their other administrative responsibilities.

This statement of support for the bill is not on behalf of the law enforcement community of the United States alone. Both IACP and APCO emphasize that the spectrum requirements of state and local government public safety communications operations of all disciplines must be considered together and must be satisfied together.

Economics are also critical. It is of little help to our local governments to put the spectrum being made available in a common pot for all comers to bid for if they are priced out of the market at the outset through auctioning procedures or user fees.

A situation which requires modern emergency response frequently requires several disciplines: law enforcement, fire, emergency medical services, and other skills.

These responders—often strangers to each other—must work as a team and must coordinate their work in receipt of a call from the public for assistance in getting the proper resources to the scene of an incident in the shortest possible time; in handling the activity at the scene; in moving people to the best place for treatment; and in all of the post-activity record-keeping which modern society demands.

Like the American public (and the rest of the world) was amazed at the high technology weaponry used recently in the Middle East, the average citizen today would be no less impressed with the technology now being implemented in public safety communications systems in the United States and that are still on the drawing boards, waiting for the spectrum allocations necessary to put it on the streets and turn it on. Rather than weapons of war, however, these are technologies that will save lives and property by speeding emergency response forces to the members of the public who need help and better deploying those forces when they reach the scene of emergency.

While each of these new technologies has as its basis the most efficient possible use of the spectrum, the total result is a demand for spectrum which far exceeds the supply now available for public safety purposes. S. 218 will certainly help but cannot be expected to produce the amount of spectrum needed by public safety plus all of the other, more commercially oriented developments toward which the legislation looks.

The public safety community urges that the Congress be more forceful in its recommendations and directives to the Federal Communications Commission to ensure that priorities in availability of spectrum be established and followed. It is clear that everyone who wishes a piece of the spectrum for his own commercial exploitation cannot be served under existing allocations.

We again raise this matter in the context of this legislation because it is a long-standing Congressional directive to the FCC that should not be lost sight of as S. 218 is enacted. There is still work to be done under previous Congressional mandates that must be reemphasized. We again urge the Committee to remind the Commission of the priority status of public safety.

The Senate Committee Report on the Communications Amendments Act of 1982 said: "radio services which are necessary for the safety of life and property deserve more consideration in allocating spectrum than those services which are more in the nature of convenience or luxury."

Members of this Committee are also familiar with the current financial crises at the state and local government levels. Local governments simply lack the resources to outbid commercial interests for spectrum rights, or to pay spectrum user fees. We strongly urge that the necessity for them to do so never be enacted.

Prepared Statement of Mr. Michael Roehrs

Mr. Chairman and members of the subcommittee, I would like to thank you for allowing me to provide additional testimony for you on S. 218, the Emerging Telecommunications Act of 1991. After my testimony and hearing the testimony of others, I am more committed than ever to this important piece of legislation.

Speaking for myself and on the behalf of other entrepreneurs, this bill is a great start, but I feel it just doesn't go far enough.

First, this bill is intended to address the lack of spectrum and addresses a solution of reassigning spectrum for commercial use. There are however other ways to gain spectrum through new emerging technologies.

PROPOSED SOLUTIONS FOR FREEING UP ADDITIONAL SPECTRUM

First, there are no financial incentives for implementing new technologies which utilize spectrum more efficiently for the incumbent user of spectrum. As an example, current voice data and video broadcast systems can provide equal if not improved quality using one-fifth the current spectrum. Why should the incumbent make a major financial investment in new spectrum efficient hardware when they have the current amount of spectrum at no cost. There needs to be some incentive to implement spectrum efficient technology to free up spectrum to be assigned to new emerging technologies.

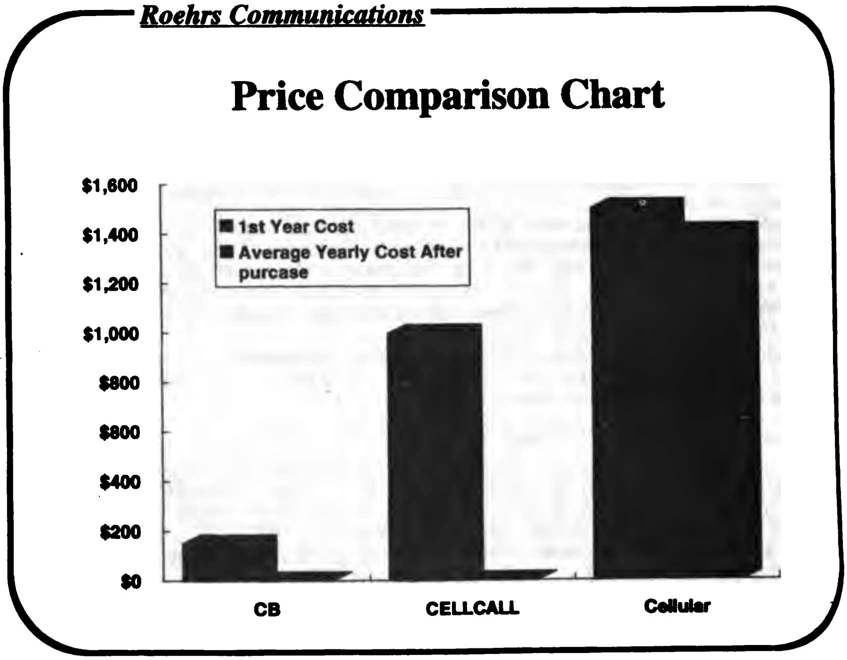
Second, spectrum is allocated to incumbents who have other medias in which to transmit information. As an example, broadcast video (TV) initially started with broadcast from towers. Today however video is primarily transmitted to the home through cable TV and satellite. Is there a need to send the same signal three different ways? It is understandable why so many UHF channels were originally allocated for future growth but realistically most of the channels reserved for this growth are being sent through cable. In many cases cable sends 100+ channels to the home today while most of the UHF channels lay fallow. Fiber optic networks are also changing the future of transferring information. The spectrum planning committee as stated in S. 218 should also plan to phase in certain technologies to other medias such as fiber optic to free up additional spectrum for future emerging technologies.

Third, spectrum can be freed up by implementing and assigning spectrum through new technical standards requiring channel sharing. Long distance carriers supply service by sharing a plurality of long distance lines with a plurality of subscribers. This allows for an exponential loading factor based on the probability that every subscriber will not use this service at the same time. In the past individual groups have been assigned specific channels (frequencies). The amount of time these individual channels are used does vary, however, it is safe to say that the majority of these channels are not used the majority of the time. Cellular and SMR networks implement channel sharing techniques but require an infrastructure to control the network. IF the network fails, everything fails. The technology developed in CELLCALL, implements the same channel reuse and channel sharing feature as cellular without the control structure. Implementing a spectrum efficient system like this would require an organized effort between incumbent spectrum licensees, organizations petitioning for rulemaking change, and the FCC.

This bill is important. Reallocating spectrum is a momentous step in the right direction. Issues as those stated above need to continually be addressed because there is only so much spectrum.

The chairman's final question to me concerned the cost of CELLCALL. An attachment to this testimony illustrates the relative cost to cellular and CB and the advantage/disadvantage charts compare features.

Referenced in S. 218, there are plans as to establish an advisory committee comprised of a group representing a variety of interests. I respectfully request to be included in this advisory committee to represent the entrepreneur and small business interests. With both small business and entrepreneurial interests adequately represented, we can be assured that the incentive exists for these individuals to continue contributing to the development of the U.S. technical industry.



Advantage/Disadvantage Comparison With Cordless Phone

Features	Cordless phone	CELLCALL
interconnect	Yes	Yes
ntification	No	Yes [1]
se	Free	Free
y (nondependent on telephone lines)	No	Yes
without telephone service	No	Yes
e to mobile or to base without telephone interco t	No	Yes
ce from other systems operating in the area	Yes	No
	No	Yes
ontrol at the home or office	No	Yes
auto security alarm call feature	No	Yes
ther users from access of the phone	Similar	Yes
message system	No	Yes
without or loss of phone service	No	Yes
se, earthquake, tornado response	No	Yes
yond the home)	No	Yes
ith automatic call back, receives and stores unattended)	No	Yes
ency	No	Yes

mber of the CELLCALL unit that initiated the call.

Advantage/Disadvantage Comparison With Cellular and CB

Features	Cellular	CB	CELLCALL
interconnect	Yes	No	Yes [2]
ntification	No	No	Yes [3]
se	$120/mo.	Free	Free
y	Yes [1]	Limited	Yes
anywhere	No	Yes	Yes
calling	Yes	No	Yes
ling	No	No	Yes [4]
l	Yes	No	Yes
ontrol at the home or office	No	No	Yes
auto security alarm call feature	No	No	Yes
ctions like a telephone	Similar	No	Yes
message system	No	No	Yes
without or loss of phone service	No	Yes	Yes
se, earthquake, tornado response	No	No	Yes
a standard telephone answering machine	No	No	Yes
by a standard/cordless phone	No	No	Yes
FXO capability	No	No	Yes

here cellular service is available.
hen within range of a node with access to the telephone line.
mber of the CELLCALL unit that initiated the call.
CELLCALL units, they may be connected to the telephone.

[Dallas Morning News, Apr. 20, 1991]

AIRWAVE AUCTION WOULD TURN DOWN VOLUME OF U.S. DEFICIT

(By Tom Steinert-Threlkeld)

's a great idea to solve the Nation's budget crisis. Sell off the airwaves.
is not a flippant suggestion. This is a serious proposal. U.S. Rep. Don Ritter,
iblican from Pennsylvania, has introduced a bill in Congress that embodies
administration proposal to auction off a portion of the radio spectrum.
idea has some appeal, when looked at from the perspective of Federal budget-
n the past, slices of spectrum have been given away through lotteries.
irn, the winners of those slices have turned around and sold their holdings
its with big pockets. In effect, they have auctioned off the slices to the highest
s.
since an auction seems inevitable, the Ritter bill proposes that the Federal
iment pocket the money and pay it to the U.S. Treasury, instead of the lottery
rs.

"Some might say this is a drastic departure from conventional communications licensing," Rep. Ritter said. "However, the reality is that private auctions are held every day for FCC licenses, with lucky FCC lottery winners making millions of dollars overnight."

In calling for an end to the "FCC lottery fiasco," he said, "is it better public policy to increase the coffers of the U.S. Treasury—in other words, the American public—or the coffers of a person holding the matching number to a lucky ping-pong ball?"

Big companies trying to bring out innovative new services, such as Apple Computer Inc., are upset. So too are entrepreneurs. They say the answer does not boil down to a choice between lotteries and auctions.

One such entrepreneur is Michael Roehrs, the president of FiberBox Inc., of Dallas. This is an outfit that caused phones to ring off the hook for weeks at the Dallas Morning News business news department, after publication in December of a brief mention of its idea, with which it hoped to revolutionize the cellular telephone industry.

The company is proposing a system that links phones in cars to home or office phones. By making those phones the access points to land lines, the company's approach will avoid charging buyers of its equipment for air time. The only cost for a mobile phone unit and a base station that attaches to the home or office phone.

The limitation to his system is that it requires a lot of radio spectrum, even with state-of-the-art transmission equipment that economizes on use of frequencies. After all, to be competitive, the system has to work well when, in a market as big as Dallas-Fort Worth, perhaps tens of thousands of users are trying to reach their phones at the same time. He needs spectrum that is not available today for such a potentially innovative service.

"Having a great communications technology and no spectrum is a little like having a great building and no land. You have no business," he testified to Congress last week. But he's a little guy, with small pockets. He can't afford to outbid large companies for the space on the airwaves.

"Entrepreneurs, almost by definition, are short on funds. If we are required to pay up front, we are at an inherent disadvantage," he said. He suggests instead a license transfer fee, which essentially lets a party such as FiberBox pay as it goes—when it is making money, not before.

What seems lost, he notes, in the debate over lotteries versus auctions as methods of allocating airwave space, is something that is basic to the Federal Communications Act of 1934. "Choose the licensee who would best serve the public interest," he said.

In effect, he is suggesting that the decisions be based on merit.

A radical notion, to be sure.

PREPARED STATEMENT OF R. CRAIG ROOS

I am R. Craig Roos, Executive Vice-President of Local Area Telecommunications, Inc. (LOCATE), President of Personal Communications Network Services of New York, Inc. and President of the National Association of Local Telecommunications Service Providers. On behalf of LOCATE, I am pleased to appear before this subcommittee today in support of S. 218, the Emerging Telecommunications Technologies Act of 1991. LOCATE fully supports S. 218's privatization of underutilized portions of the radio frequency spectrum currently allocated for Federal Government use.

As an active participant in the telecommunications industry since 1981, LOCATE has continuously pushed the edge of technology in developing spectrum-efficient radio technologies and their potential applications in service offerings to meet the increasingly sophisticated telecommunications needs of today's business users. For the past ten years, LOCATE has focused primarily on providing competitive access services to the business community via its FCC-licensed microwave facilities. LOCATE offers high quality, high capacity point-to-point and point-to-multipoint services using state-of-the art microwave equipment. LOCATE also is the only entity to offer commercially employed Digital Termination Service. In the New York City metropolitan area, LOCATE operates an extensive microwave network comprised of over 75 links, and serves over 80 large commercial customers, including brokerage houses, banks and other financial institutions. In the telecommunications industry, LOCATE has distinguished itself as the largest operator of urban area, short haul digital microwave links in the United States. Having firmly established itself as an competitive access provider, LOCATE has plans to commit its extensive telecommunications experience and expertise to the development of personal communications services.

Pursuant to experimental authorization issued by the Federal Communications Commission, LOCATE and its subsidiary, Personal Communications Network Services of New York, Inc. have commenced field trials of personal communications network ("PCN") technology in the New York City metropolitan area. LOCATE and its subsidiary have also applied for FCC authorization to construct and operate similar experimental PCNs in San Diego, Los Angeles, San Juan and to test a specific type of cordless telephony, commonly referred to as CT-3, in the New York City metropolitan area. To ensure the success of these trials, LOCATE has committed a significant amount of its resources to the exploration of these technologies. In addition, LOCATE has been an active participant in the Notice of Inquiry initiated by the FCC to consider a broad range of issues regarding personalized communications services. The results of these experimental trials and the efforts of the FCC will be wasted, however, unless adequate spectrum is allocated and assigned for PCN use immediately.

LOCATE firmly believes that the speed with which personalized communications technologies, such as PCN, are made available to the American people will be critical to ensuring the efficient use of any frequencies reallocated to private industry by S. 218. Accordingly, LOCATE urges Congress to make the introduction of PCNs to the American public a national priority by fine tuning S. 218 to include provisions which will expedite the introduction of personalized communications services to the American people and the United State business community. Specifically, LOCATE recommends that S. 218 be amended to:

- require expressly the reallocation of spectrum to available personalized communications services including specifically PCN within 12 months of enactment of S. 218;
- direct the FCC to develop rules and procedures, within 12 months of enactment S. 218, for the selection of a limited number of PCN licensees for each of the Nation's top ninety markets following an expedited and streamlined comparative analysis of the applicants' qualifications;
- direct the FCC to assign PCN licenses for the top ninety markets no later than 18 months following the date of enactment of S. 218; and
- if compensation to the Federal Government for the reallocated frequencies is deemed necessary, to direct the FCC to develop rules for a system to compensate the Federal Government for use of the spectrum which maximizes the opportunities for qualified applicants to participate in the licensing process. Such a system could involve the collection of a recurring fee from licensees calculated as a percentage of service revenues.

The National Telecommunications and Information Administration ("NTIA") has proposed that the renewed source of spectrum, made available for commercial use by reallocation of underutilized spectrum from the Federal Government, be assigned to the highest bidder by a spectrum auction. Such a licensing procedure would sound a death knell for competition in the telecommunications industry and result in the inefficient use of the newly released spectrum.

LOCATE urges Congress to reject NTIA's proposal to reassign this renewed source of spectrum through a competitive bidding process and instead to institute an expedited and streamlined comparative process under which successful applicants would pay fees and taxes as services are deployed for the following reasons:

(1) NTIA's spectrum auction proposal focuses exclusively on short term revenue gains and will undercut the development of a long term, cohesive spectrum licensing policy;

(2) NTIA's proposal to allocate the released spectrum through a spectrum auction would assign spectrum to companies purely on the basis of financial might to the direct exclusion of smaller and mid sized companies which may be better qualified to utilize efficiently spectrum resources but financially incapable of competing against the Goliaths of the industry. A spectrum auction will lead to consolidation of market power and erode the beneficial checks and balances imposed by competitors on service prices and quality.

(3) spectrum auctions will stymie innovation and eliminate any incentive for "pioneers" and small and mid-sized companies to commit their resources to the research and development of new technologies and novel service offerings by pricing these entities out of the spectrum market.

(4) In the long term, the Federal Government will receive more revenue from assigning use of the spectrum to the applicants best situated to provide the novel services because successful implementation of the new technologies and services will generate increased tax revenues, on a continuing basis, by increasing employment and income taxes, providing for capital gains taxes and generally increasing the level of other taxable activities.

The stagnation in technological innovation that will result from a spectrum auction will be irreversible and put the United States at a distinct disadvantage internationally. Moreover, the assignment of spectrum resources purely on financial merit will not ensure that the American people benefit from the reallocation of spectrum.

THE DIRE NEED FOR ADDITIONAL SPECTRUM

A Reallocation of Spectrum is Critical to the Introduction of New Technologies

LOCATE commends Chairman Inouye and Senators Hollings, Gore and Lautenberg for introducing S. 218 which recognizes the immediate need for privatization of frequencies currently underutilized by the Federal Government. The United States is at an important cross-roads in the development of its telecommunications infrastructure. New technologies and services, such as PCN, that will advance substantially the ability of United States consumers and businesses to communicate efficiently are rapidly being developed. These services will be essential to satisfy the telecommunications needs of the public in the 21st century and to respond to the strong public support for an advanced telecommunications infrastructure. Indeed, it is likely that many of the emerging personal communications service technologies will revolutionize the way we communicate and may soon be considered as essential to the conduct of business in the United States as the computer is today.

THE FEDERAL GOVERNMENT AND PRIVATE SECTOR AGREE ON THE NEED FOR FURTHER PRIVATIZATION OF THE SPECTRUM

There is virtually no dispute that additional portions of the spectrum are needed for private, commercial use and that the best source of spectrum is frequencies underutilized by the Federal Government. The FCC, the Bush Administration, and the private sector all agree concretely on the dire need for a reallocation of government spectrum for commercial use and generally support the goals of S. 218. This support is not surprising since S. 218 adequately safeguards the Federal Government's need for spectrum and increases the efficient use of the radio spectrum by reallocating those frequencies underutilized by the Federal Government to the private sector.

ADEQUATE SPECTRUM SHOULD BE IMMEDIATELY ALLOCATED FOR PERSONAL COMMUNICATIONS SERVICES

The primary goal of S. 218's privatization of spectrum is to foster the development and use of new telecommunications technologies by the private sector. As demonstrated by the increasing number of experimental applications and proposals for new radio technologies being filed at the FCC, the private sector, is ready to make efficient use of this spectrum immediately and to respond to the Nation's demand for new services and technologies.

LOCATE firmly believes that the introduction of PCNs and other innovative personalized communications technologies is the next major evolutionary step in the development of advanced telecommunications both in the United States and internationally. The increasing consumer demand for the flexible mobile communications offered by PCNs and the inability of existing services to satisfy that demand reveals the immediate need to identify and allocate spectrum for personal communications services.

Furthermore, introduction of these technologies in other countries illustrates that the United States must act quickly if it is to remain a leader in state-of-the-art telecommunications and to remain competitive internationally. Several countries including the United Kingdom have already begun to introduce personal communications services to their populace. Other countries have established concrete time frames for the construction and operation of PCNs to accelerate the introduction of PCNs. By contrast, here in the United States, the FCC has just begun to explore the broad issue of personal communications services. It has been only in the past few months that the FCC has asked for initial public input on the various technologies and frequency allocation options. Not surprisingly, the public has responded with a wealth of comments on these issues—a good deal of which is directed at competing demands for scarce spectrum. Absent congressional action, the demand for spectrum promises to enmesh the FCC, and companies seeking to provide new services and existing spectrum users, in protracted regulatory proceedings that will significantly delay the introduction of advance personal communications services.

With the rapid advancements being made in the telecommunications infrastructures of other countries, the United States does not have the luxury to await the completion of a leisurely paced, full fledged regulatory cycle. Indeed, the unavoidable delay inherent in such a regulatory process could render the United States telecommunications infrastructure arcane and out-of-step when compared to those of other industrialized nations. To ensure that the United States telecommunications infrastructure is not surpassed by those of other nations, LOCATE urges Congress to assert its leadership to expedite the introduction of personalized communications services to the American people. Given the strong public support for PCN, Congressional leadership is both necessary and appropriate to foster the implementation of PCN. Through the Notice of Inquiry, the FCC has already acquired all of the information necessary to allocate spectrum to PCN and to adopt licensing procedures. There is no reason, however, for Congress to unnecessarily delay the introduction of PCN to the American people by delegating all responsibility for PCN to the FCC. Congress could narrow substantially the issues which the FCC must address and which threaten to elongate the regulatory process by directly allocating spectrum to PCN and by directing the FCC to issue PCN licenses through the use of expedited and streamlined comparative hearings.

LOCATE strongly recommends that S. 218 be amended to require the identification and reallocation of adequate spectrum—based on LOCATE's experimentation with PCN technology, LOCATE has determined that PCNs will operate most efficiently on 140 MHz of suitable spectrum—for personal communications services, including PCNs, not later than 12 months following the enactment of S. 218. In combination with the accelerated licensing scheme I will describe in a moment, the amendment of S. 218 to include definite time frame for release of frequencies for these new services will establish the United States' commitment to maintaining its position as one of the most advanced industrialized nations in the world.

SELECTION OF LICENSEES

NTIA and others have proposed a licensing process which would grant the FCC authority to assign licenses for the reallocated spectrum through a competitive bidding process. This licensing scheme was originally proposed by NTIA in its report, U.S. Spectrum Management Policy: Agenda for the Future. Although the process is intended to compensate the Federal Government for use of the reallocated spectrum and to eliminate the common practice, which arose under the FCC's lottery procedures, of unqualified applicants filing for and "winning" radio spectrum licenses for the sole purpose of reselling them for profit, the spectrum auction process merely rewards financial wealth (often accumulated through earlier FCC allocations) by auctioning off our Nation's precious spectrum resources to the highest bidder.

Spectrum auctions are supported by the FCC and NTIA primarily as a source of raising revenue for the Federal Government. The competitive bidding proposal, however, is short sighted and is not the best means of satisfying that stated objective, let alone other important policy goals. Reliance on an auction option focuses primarily on one-time, non-recurring potential revenues to the Federal Government and disregards other non recurring revenue generators and turns a blind eye toward the important public policy concerns surrounding the use of our Nation's spectrum resources. In the long term, the assignment of frequencies through competitive bidding will result in irreparable damage to the U.S. telecommunications industry and disserve the public interest.

The Competitive Bidding Process will Discriminate Against Small and Mid-Size Companies

The competitive bidding process as proposed by NTIA and others would award the Nation's precious spectrum resources to companies based almost exclusively on the magnitude of their bank accounts and credit lines. By definition, spectrum auctions would directly exclude companies with less resources which are incapable of supporting the enormous debt that would be required to outbid the Goliaths of the industry. The companies disproportionately excluded by this process would inevitably be small or mid-sized companies, recently established companies and entrepreneurial firms (many of which are headed by women and minorities) who may possess the necessary technical merit, skill, and innovation to construct and operate the services but who lack the financial might required to "buy" the required frequencies.

The prospect alone of being forced to compete primarily on a financial basis or to incur substantial indebtedness to acquire the frequencies necessary to operate the service is likely to deter many potentially qualified applicants from even entering the applicant pool. While on its face the spectrum auction process appears to be competitive, adoption of such measures, in fact, would reverse the trend towards full competition in the telecommunications industry—competition which this Congress, the FCC and the Courts have worked so hard to foster in the recent years.

The concrete benefits to the American people of the competitive policies are evident from an analysis of the telecommunications market today. The entry of competitive service providers like LOCATE has lowered the price of advanced telecommunications services and simultaneously increased the quality and range of services available to the American people. For example, as a result of the entry of competitive access service providers the prices for the range of services provided by competitive access providers have fallen an astonishing 40 percent over the last three years. Competition in the PCN market will create similar pressure for PCN operators to provide high-quality services at reasonable prices.

The foreclosure of smaller competitive service providers from the licensing process through the use of spectrum auctions could threaten competition in the telecommunications industry as a whole. By denying smaller, competitive companies the ability to obtain new spectrum their ability to survive in the market will be threatened. Indeed, many smaller companies may be forced out of the telecommunications industry entirely. This drastic reduction in competition, which could easily result from the adoption of the spectrum auction process, will eliminate the checks and balances inherent in the market system which have lowered service prices and enhanced service quality for telecommunications services.

The Competitive Bidding Process Will Not Ensure the Most Efficient Use of the Reallocated Frequencies

NTIA's competitive bidding process does not contain any protections to ensure that the highest bidder who "wins" the purchased frequencies will use those frequencies efficiently or, for that matter, that the frequencies will be used at all. Indeed, the proposal creates a real danger that companies will participate in the bidding primarily to remove the frequencies from the market either to protect their existing services from competition or to reserve the frequencies for a future unidentified use. By contrast, as I will explain in further detail in a moment, LOCATE believes that S. 218 should be amended to require the FCC to conduct a highly streamlined and expedited comparative appraisal of the proposed use of the reallocated frequencies by particular applicants to ensure that this scarce resource is not warehoused, but put to its optimal use.

In addition, as the only entity actually to pursue DTS/DEMS operations, LOCATE urges Congress to consider directing the FCC to require licensees, as a condition of their licenses, to reach certain operational milestones towards the commencement of service within predesignated time limits in order to prevent companies from "hoarding" frequencies and to ensure their efficient use. The forfeiture of the license which would result from failing to meet the established operational milestones would create a strong incentive for expedient use of the real located spectrum and promote prompt introduction of new advanced telecommunications services to the American people and U.S. business. Further, under this proposal, if the reallocated spectrum is not utilized it would not remain stagnant but rather would be promptly made available for reallocation.

The Competitive Bidding Process Does not Consider an Applicant's Contribution to the Development of a New Technology

The spectrum auction process will not only unjustly discriminate against small and mid-sized companies as a class generally, it will also unfairly and harshly penalize smaller, innovative companies involved directly in extending the boundaries of technology to develop new services to meet increasingly sophisticated telecommunications needs. A spectrum auction process has the direct potential to exclude companies such as LOCATE, which have already committed a significant amount of their resources to the exploration of new technologies, from ever becoming a licensee for the service they are helping to create. LOCATE opposes licensing procedures, such as the spectrum auction, that exclude companies which could make the best use of the spectrum based on an appraisal of the applicant's technical merit, qualifications to make efficient use of the spectrum, or contribution to the development and evaluation of a new service or technology. As the pace of technological advancement accelerates and the complexity of new technologies increases, the United States must adopt licensing procedures that actively encourage research into and development of new technologies. Barring smaller but well-qualified companies from available spectrum, however, will only stymie further investment in research and development of new technologies by innovative companies and entrepreneurs. Similarly, larger companies who possess the financial strength to outbid competitive applicants, would be in a position to exploit the research and development efforts of smaller companies by precluding the innovator's use of the spectrum and then deploying a service based on the very technology developed by the smaller companies.

The FCC has recognized that its licensing procedures could further the development of new technologies and service offerings by rewarding innovation and development recently when it initiated a rulemaking to explore the possibility of establishing a "pioneer's preference." LOCATE enthusiastically supports the "pioneer's preference" licensing proposal which would grant innovators of new radio-based services preferential treatment in the licensing process to encourage the continued devotion of resources and imagination necessary to develop new services and radio-based technologies. (A copy of the comments filed by LOCATE in that proceeding are attached.) In direct contrast to the sound policy of encouraging innovation, the competitive bidding process disregards any value attributed to research and development efforts of a prospective licensee and renders financial might the central qualification.

The competitive bidding process will also erode the FCC's substantive oversight of the licensing process. Contrary to the intent of the Communications Act, the spectrum auction process gives the FCC little opportunity to fulfill its public interest mandate to determine the best use of this Nation's radio frequency spectrum. The FCC's role will be reduced, in essence, to that of an auctioneer—void of any substantive evaluation of the relative merits of the competing applicants. A closer examination of the qualifications of an applicant to provide one of the new personalized communications services or other service is particularly important in licensing services that use new technologies since, for many of these technologies, the necessary qualifications for prospective licensees have not yet been established.

A More Equitable Licensing Procedure Can Be Adopted Which Includes Compensation to the Government

LOCATE recognizes that the radio frequency spectrum allocated to the Federal Government is a valuable resource. Moreover, LOCATE is not unsympathetic to the fiscal difficulties confronted by the Federal Government. However, there are many alternative mechanisms more equitable than the spectrum auction process for assigning the reallocated spectrum. Mechanisms which do not merely consider short term revenue goals but also recognize the long term benefits of reallocating spectrum to applicants whose technical and other merits will maximize the use of the spectrum and serve the public good interest.

In order to balance the Federal Government's need for revenue with the financial constraints of well-qualified potential applicants, LOCATE strongly recommends that S. 218 be amended to: (1) direct the FCC within 12 months of the enactment of S. 218 to adopt rules establish procedures to hold streamlined comparative hearings, on an expedited basis, that will weigh a variety of technical, legal, financial and public interest factors and promptly award licenses for PCN and other personal communications services technologies to the best qualified applicant; and (2) if compensation to the Federal Government for the reallocation of spectrum is determined to be desirable, to direct the FCC to establish a plan for the Federal Government to collect a reasonable, recurring fee from licensees based on the operational revenues of each licensees generated by the deployed services. If this approach is taken, LOCATE believes that substantial user based fees could surpass quickly the revenue that could have been raised through a spectrum auction and furthermore provide addition revenues for the Federal Government from new employment taxes, incomes taxes, and other fees. This is in addition to the gain created by efficient allocation of resources in affiliated manufacturing and research and development operations.

If it is determined that the spectrum will be reassigned only through use of a spectrum auction, LOCATE urges Congress to require the FCC to set aside a portion of the frequencies for allocation to smaller and mid-sized companies which will be shut out by the auction process. Such set-asides would counteract the inequities of the spectrum auction process, minimize the discriminatory impact of auctions on smaller and mid-sized companies and support the continued growth of competition in the telecommunications industry.

S. 218 Should be Amended to Require the FCC to Initiate the Licensing Process for Personal Communications Services Within 12 Months of Enactment of this Legislation

In order for S. 218 to effectively relieve the current spectrum scarcity, this renewed source of commercial spectrum must be carefully and expediently assigned by the FCC to those licensees who are qualified and technically capable of bringing the telecommunications infrastructure and this Nation into the 21st century. As I indicated earlier, the personalized communications services revolution is well underway internationally. Many other countries who have made a national commitment to add personal communications services to their telecommunications infrastructure are positioned to surpass the United States in technological advancement and innovation to the detriment of our Nation and the United States business community. Congress must act now to pave the way for the introduction of personalized communications services such as PCN if the United States is to compete effectively, in this information age, with our global competitors. Accordingly, a national commitment to the expedient introduction of personalized communications services is needed.

S. 218 represents a first step in the right direction. However, its general time frame for the identification and reallocation of government spectrum is too long and will adversely delay the introduction of personal communications services. To facilitate the immediate availability of advanced personal communications service technologies, LOCATE urges Congress to amend S. 218 to direct the FCC to adopt rules formalizing the procedure for licensing PCNs in major metropolitan areas no later than 12 months after the date of enactment of this legislation. This time frame, which parallels that for identification of the frequencies to be reallocated for personalized communications services, will ensure that once the spectrum is available it can be immediately assigned. To prevent any potential delay in the completion of the licensing procedures, Congress should further direct the FCC to make these licensing procedures a priority by requiring the issuance of PCN licenses for the Nation's major metropolitan markets within 18 months following enactment of S. 218.

It is LOCATE's firm belief that the public interest is best served by a licensing procedure that requires a streamlined, expedited comparative analysis of the potential applicants ability to efficiently use the spectrum. The novel features of many of the new technologies render the superficial analysis of a potential licensee's qualifications undertaken in the spectrum auction and lottery processes inadequate as a means of assigning the reallocated spectrum. LOCATE strongly recommends that S. 218 be amended to instruct the FCC to create a licensing framework that recognizes, by use of a simple preference system or some other efficient, streamlined procedure, the value of small companies existing radio licenses, technology or service innovation (the "pioneer's preference") and other relevant factors. Let me emphasize that LOCATE is not proposing that the FCC hold time-consuming and costly comparative hearings like the ones we saw for the first top cellular markets. Instead, LOCATE supports a very streamlined licensing approach which will recognize the relative individual qualifications of applicants while ensuring that new technologies and services employing reallocated spectrum are brought to the American public as soon as possible. Only streamlined, expedited licensing that recognizes the differences among competing applicants and enables the FCC to consider fully the comparative technical merit of each applicant will achieve this goal. Such a procedure will also provide the FCC with the flexibility necessary to establish appropriate criteria for evaluating applicants for different services.

LOCATE also encourages Congress to direct the FCC to limit the number of PCN licensees in a single market. Unlimited licensing of PCNs will result in an overcrowding of frequencies and degrade substantially the quality of service. Since the American people are unlikely to tolerate the interference that will be created by overcrowding, an unlimited licensing procedure would result in the inefficient use of the spectrum allocated to PCN.

If the Federal Government is to be Compensated for the Reallocated Spectrum, S. 218 Should Require the FCC to Develop an Equitable Procedure of Compensation to the Government

The competitive bidding proposal is described by its supporters as an efficient use of market forces to determine the value and best use of the reallocated frequencies. In effect, however, it excludes many potential applicants from the process because the prospect of assuming unmanageable debt for small and mid-sized companies is unworkable. The exclusive nature of the competitive bidding process is contrary to the U.S.'s traditional pro-competitive policies. For true competition to exist, the FCC must develop a system that allows potential licensees to compensate the Federal Government for the spectrum from the revenues produced from use of the spectrum. LOCATE believes it is unrealistic to expect any potential licensee seeking to provide a new service to the public, other than those with other large service offerings, to commit itself to payment of a predetermined amount for the spectrum, lump sum or otherwise, prior to initiation of the services.

In recognition of the concrete competitive value of fostering a diverse telecommunications industry, LOCATE, therefore, recommends that licensees not be selected solely on financial criterion and that if licensees are required to compensate the Federal Government for the real located spectrum that the level of compensation be determined based on the actual revenues derived from the services and collected on an annual basis for the duration of the license. Since such a system would maximize the number of qualified applicants who apply for a license, the probability that the newly deployed services will be successful will be enhanced and indirectly result in improved government revenues and better economic conditions through the creation of new jobs, the expansion of the tax base and the increased investment in the expanded telecommunications infrastructure. Accordingly, adoption of such a reasonable fee system, if one is required, will balance adequately the revenue concerns of the Federal Government without foreclosing smaller and mid-sized companies from applying for the licenses.

CONCLUSION

The reallocation of underutilized Federal Government spectrum to the private sector is essential to the continued advancement of the United States telecommunications infrastructure and to the global competitiveness of the United States telecommunications industry. In order to foster the development and introduction of new telecommunications technologies in the United States, it is vital that S. 218 be enacted in this session of Congress with the additional provisions to expedite the process for allocating and assigning newly available spectrum to PCN and that the spectrum auction proposal of NTIA and others be rejected.

Specifically, LOCATE urges the members of this subcommittee to further consider fine tuning S. 218 to include provisions which will expedite the introduction of personalized communications services to the American people and the United State business community by:

- expressly requiring the FCC to reallocate spectrum to available personalized communications services including specifically PCN within 12 months of enactment of S. 218;
- directing the FCC to develop rules and procedures, within 12 months of enactment of S. 218, for the selection of PCN licensees for the Nation's top ninety markets following an expedited and streamlined comparative analysis of the applicants' qualifications;
- directing the FCC to assign PCN licenses for the top ninety markets no later than 18 months following the date of enactment of S. 218; and directing the FCC to develop rules for a system to compensate the Federal Government for use of the spectrum which maximizes the opportunities for qualified applicants to participate in the licensing process, if compensation to. the Federal Government for the reallocated frequencies is deemed necessary. Such a system could involve the collection of a recurring fee calculated as a percentage of service revenues.

LOCATE further urges Congress to reject NTIA's spectrum auctionproposal on policy grounds because:

(1) It improperly focuses exclusively on the short term revenue gains and undercuts the development of a long term, cohesive spectrum licensing policy;

(2) It allocates the released spectrum to companies purely on the basis of financial might to the direct exclusion of smaller and mid-sized companies which may be better qualified to utilize efficiently spectrum resources but financially incapable of competing against the Goliaths of the industry. A spectrum auction will lead to consolidation of market power and erode the beneficial checks and balances imposed by competitors on service prices and quality; and

(3) Spectrum auctions will stymie innovation and eliminate any incentive for "pioneers" and small and mid-sized companies to commit their resources to the research and development of new technologies and novel service offerings by pricing these entities out of the spectrum market.

(4) In the long term, the Federal Government will receive more revenue from assigning use of the spectrum to the applicants best situated to provide the novel services because successful implementation of the new technologies and services will generate increased tax revenues, on a continuing basis, by increasing employment and income taxes, providing for capital gains taxes and generally increasing the level of other taxable activities.

LOCATE remains committed to its involvement in the implementation of emerging telecommunications services and is pleased to share its view with this subcommittee on this critical issue for our Nation.

BEFORE THE FEDERAL COMMUNICATION COMMISSION, WASHINGTON, DC

IN THE MATTER OF ESTABLISHMENT OF PROCEDURES TO PROVIDE A PREFERENCE TO APPLICANTS PROPOSING AN ALLOCATION FOR NEW SERVICES—GEN. DOCKET NO. 90–217

COMMENTS OF LOCAL AREA TELECOMMUNICATIONS, INC.

Local Area Telecommunications, Inc. ("LOCATE"), by its undersigned attorneys, hereby submits its comments on the Commission's proposal to award a so-called "pioneer's preference" to applicants seeking radio spectrum allocations for the purpose of developing and implementing new communications services. Subject to the concerns articulated below, LOCATE supports generally the Commission's proposal to afford preferential treatment in the licensing process to parties who invest substantial resources in the development and implementation of new technologies.

LOCATE is the leading provider of alternative intracity specialized radio telecommunications services. Founded in 1981, LOCATE provides a broad range of alternative access communications services, primarily via its FCC-licensed microwave facilities, to interexchange carriers and business users in various metropolitan areas nationwide. LOCATE also serves cellular telephone operators by providing microwave radio connectivity between cell sites. LOCATE offers high quality, high capacity point-to-point and point-to-multipoint services using state-of-the-art microwave equipment operating primarily in the 2, 6, 10, 11, 18 and 23 GHz range LOCATE also offers Digital Termination Service in New York City and is one of the few existing DTS licensees that has installed and is currently operating such a system.

In the New York City metropolitan area, LOCATE operates an extensive microwave network comprised of over 75 links, and serves over 80 large commercial customers, including brokerage houses, banks and other financial institutions. Approximately one-half of LOCATE's business is centered in the New York City area.

Recently, on June 25, 1990, LOCATE filed an application for an experimental license with the Commission seeking authority to conduct Personal Communications Network ("PCN") experiments, using spread spectrum technology, in the New York City metropolitan area. LOCATE proposes therein to evaluate the technical, operational and market demand characteristics of PCN service. From its perspective as a microwave radio service licensee, LOCATE also proposes to evaluate the extent to which the introduction of PCN services in a densely populated urban environment will pose harmful frequency interference risks for existing microwave licensees, and to identify synergistic opportunities for microwave licensees in the PCN marketplace. Given its substantial experience and demonstrated technical, operational, marketing and financial expertise in implementing and operating such state-of-the-art radio based networks as DTS, LOCATE is uniquely qualified to contribute to the development and implementation of novel and innovative radio-based services such as PCN.[1]

In an April 27, 1990 Notice of Proposed Rulemaking ("Notice"), the Commission proposes to afford preferential treatment in the licensing process to entrepreneurs that develop new communications services and products that require spectrum allocations. In particular, the Notice proposes to guarantee a party first proposing a new service through a spectrum allocation rule change an opportunity to secure a license to operate in that service. The Commission further proposes to defer action on applications from other parties that seek to provide the new service in the same geographic areas in which the pioneer proposes to operate for a six-month period following the grant of the initial construction permit or license to the pioneer.

LOCATE enthusiastically supports the Commission's express objective in this rulemaking proceeding—counterbalancing the significant delay, risk and expense which innovators incur in obtaining radio spectrum necessary to implement novel communications services with a regulatory advantage designed to encourage innovators to invest capital and resources in novel technologies and services. As a general proposition, extension of a pioneer's preference to such innovators should, much the way the copyright and patent laws protect and motivate authors, artists and inventors in other contexts, encourage innovation by radio frequency-based entrepreneurs.

As currently crafted, however, the Commission's proposal would extend preferential treatment to an overly broad class of entrepreneurs, and would encourage speculative rulemaking petitions and applications. Specifically, the Notice proposes to reward with preferential treatment entrepreneur that first proposes a new service through a spectrum allocation rulemaking petition. In fashioning a pioneer's preference scheme, LOCATE urges the Commission to circumscribe more narrowly the class of entrepreneurs eligible for the preference so as to reward only those entrepreneurs who demonstrate unique qualifications, and/or who exhibit the intent and the ability to invest significant capital and other resources on a timely basis, to develop and implement new services and technologies.

As a business enterprise that relies heavily on the availability of radio spectrum, LOCATE opposes any preference scheme that would encourage applicants to seek spectrum allocations, construction permits and operating licenses on the basis of speculation, as opposed to concrete plans to develop and implement meaningful new services and technologies. As proposed in the Notice, the preference scheme would invite speculators to seek pioneer's preferences merely by filing petitions requesting spectrum allocations for new services, without regard to whether there is any serious likelihood that the "pioneer" will invest on a timely basis the capital and other resources needed to implement the proposed service.

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[1] In its experimental license application, LOCATE has, subject to the policy determinations ultimately reached in the instant proceeding, requested a pioneer's preference in connection with its proposed PCN services.

In other contexts, the Commission has found that the public interest is served by licensing schemes that differentiate (at least initially) among applicants on the basis of objective criteria designed to ensure that an applicant is able, willing and qualified to implement a new service. Thus, in 1981 the Commission determined, in order to expedite the introduction of cellular telephone service in the most populated and congested cities, to establish a separate frequency allocation in each metropolitan cellular radio market for wireline telephone companies seeking to operate cellular telephone networks. The Commission reasoned that this scheme, which effectively afforded preferential licensing treatment to wireline telephone companies for an initial five-year period, would ensure prompt introduction of cellular telephone services in markets in which significant demand had emerged for those services. Among other factors, the Commission specifically noted that the wireline telephone companies had already conducted the most successful research and development efforts in mobile telephony, and had in providing wireline service developed extensive expertise and technical capabilities directly relevant to the implementation of cellular radio networks—expertise which no other class of applicants could credibly claim.[2]

The Commission has in other contexts employed a variety of devices to differentiate among serious proponents of new services on one hand and speculative ventures on the other hand. In an effort to expedite the introduction of mobile satellite services, the Commission recently required applicants in that service to demonstrate their ability and willingness to finance the proposed mobile satellite venture by depositing 55 million into an escrow account.[3] The Commission has in other circumstances constrained licensees from transferring their interests in FCC authorizations to third parties,[4] and has required licensees to achieve specific milestones within designated time frames to demonstrate their commitment to implement services for which they have secured licenses.[5]

Consistent with these policy initiatives designed to deter speculation in licenses and authorizations, LOCATE respectfully submits that the Commission must, to accomplish the goals set forth in the Notice, more narrowly tailor its pioneer preference proposal to avoid the perverse result of encouraging insincere "pioneers" to participate speculatively in the spectrum allocation and licensing process. To that end, LOCATE urges the Commission to refine the pioneer preference eligibility criteria proposed in the Notice along the following lines:

- In determining whether to award a pioneer's preference to an entrepreneur that seeks a spectrum allocation for a new service or technology, the Commission should consider whether the "pioneer" offers technical expertise and/or experience in the relevant geographic market that would contribute significantly to the prompt and effective implementation of the new service or technology. Consistent with the approach the Commission adopted in the cellular radio licensing rulemaking proceeding, a pioneer preference scheme should reward entrepreneurs who offer unique qualifications, rather than those who merely file the first spectrum allocation rulemaking petition, thereby more likely ensuring the prompt introduction of new services to the American public.[6]

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[2] *See generally An Inquiry Into the Use of the Bands 825–845 MHz and 870–890 MHz for Cellular Communications Systems; and Amendment of Parts 2 and 22 of the Commission's Rules Relative to Cellular Communications Systems*, 86 FCC 2d 469 (1981), *recon.* 89 FCC 2d 58 (1982).

[3] *See Amendment of Parts 2, 22 and 25 of the Commission's Rules to Allocate Spectrum for, and to Establish Other Rules and Policies Pertaining to the Use of Radio Frequencies in a Land Mobile Satellite Service for the Provision of Various Common Carrier Services*, 2 FCC Rcd 485 (1987).

[4] *E.g., Bill Welch*, 3 FCC Rcd 6502 (1988) (transfers and assignments of cellular construction permits are reviewed under 47 C.F.R. s 22.40(b) for any evidence indicating speculative intent).

[5] *See, e.g., RCA American Communications. Inc.*, Mimeo No. 7115, Mass Media Bureau (released Sept. 19, 1975) (conditioning grant of DBS authorizations upon commencement of construction or execution of construction contract within one year of permit grant); *see generally Establishment of Satellite Systems Providing International Communications*, 101 FCC 2d 1046 (1985) (adopting policy to condition grant of construction permits for separate international satellite systems upon subsequent showing that the permittee possesses sufficient non-contingent funds to meet the costs of constructing, launching and operating the proposed system for one year after launch).

[6] Thus, for example, LOCATE's extensive expertise in the implementation and operation of radio-based services in the New York City metropolitan area should be accorded substantial

Continued

- The Commission should evaluate the financial ability and the commitment of an entrepreneur to develop and implement new technologies requiring spectrum allocations in considering a request for a pioneer's preference. In particular, the Commission should consider, as a condition for securing a pioneer's preference, requiring entrepreneurs to deposit funds into an escrow account to demonstrate their ability and willingness to finance their proposals. The precise amount of such deposits could be established on a case-by-case basis, factoring in developmental cost variables unique to each service proposal. Such a requirement would be particularly significant when evaluating a pioneer's preference request from a new entrant with no track record in developing and implementing novel radio-based technologies.
- To ensure continued commitment to the development and implementation of a new technology following grant of a pioneer's preference, the Commission should require the beneficiaries of any pioneer preference policy to achieve certain milestones within predesignated time limits. Such milestones should be established on a case-by-case basis, tailored to the specific service proposal for which the pioneer is granted preferential treatment. Absent a good cause showing, pioneers who fail to meet those milestones should be subject to revocation of the licensing preference.
- To deter speculation, the Commission should develop appropriate restraints on transfers of interests by pioneers who have not previously been involved with similar operations, or using related technologies, or who have not been active in the communications industry for at least a three year prior period. Such restraints should not unduly constrain pioneers from securing financing for their ventures, while at the same time discouraging entrepreneurs from securing pioneer preferences merely to realize a financial gain through sale of the venture to a third party once the preference has been secured.
- The Commission should consider award of preferences not only to entrepreneurs that seek spectrum allocations via the rulemaking process for new services, but to those that engage in other types of activity that evidence an intent to develop and implement a new service. Experimental licensees who devote substantial capital and resources to the development of new services and technologies, for example, should not be denied a pioneer's preference merely on the basis that their efforts have not yet progressed to the point at which a spectrum allocation rulemaking petition would be appropriate. Any preferential licensing scheme that rewards only those entrepreneurs who file rulemaking petitions would serve to encourage the premature filing of spectrum allocation petitions.

Finally, LOCATE urges the Commission to apply any pioneer's preference retrospectively, to entrepreneurs who otherwise qualify for the preference, who have sought spectrum allocations, filed experimental license applications or undertaken other qualifying activities prior to the time at which the instant rulemaking concludes. In particular, LOCATE submits that the Commission should afford entrepreneurs during a finite period of "time after final rules are adopted in this proceeding an opportunity to seek a pioneer's preference with regard to any rulemaking petitions, experimental license applications or other qualifying actions filed during the pendency of this proceeding.

CONCLUSION

For the foregoing reasons, LOCATE respectfully urges the Commission to refine further the eligibility standards proposed in the notice so as to reward those pioneers who demonstrate unique qualifications to develop and implement new services as well as an intent and the ability to invest capital and other resources in the development and prompt implementation of those services, rather than those who merely file petitions for spectrum allocations for new services.

RE: PROPOSED AMENDMENTS TO S. 218, THE EMERGING TELECOMMUNICATIONS TECHNOLOGIES ACT OF 1991

DEAR CHAIRMAN INOUYE: At the Subcommittee's hearing on S. 218, the Emerging Telecommunications Technology Act of 1991, on April 11th, 1991, you requested that proposed amendments to S. 218 be submitted to the Subcommittee within 10 days. On behalf of Local Area Telecommunications, Inc., ("LOCATE"), I was pleased to testify before the Subcommittee in support of S. 218. Pursuant to your request, LOCATE is submitting the attached proposed amendments to S. 218. These amendments will expedite the introduction of currently available advanced personal communications service technologies to the American people.

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weight in evaluating any request by LOCATE for a pioneer's preference in connection with radio-based services such as PCN in the New York City area.

As I stated in my testimony, LOCATE firmly believes that an immediate allocation of spectrum for PCNs is essential to the success of PCNs and to ensuring that our nation's telecommunications infrastructure remains competitive internationally. This Subcommittee can help guarantee that suitable spectrum is made available to PCNs by amending S. 218 to: (1) specifically require the FCC to allocate 140 MHz of spectrum to PCNs within 12 months of enactment of S. 218; (2) direct the FCC to develop rules and procedures, within 12 months of enactment of S. 218, for the selection of PCN licensees through an expedited and streamlined comparative analysis of the applicants' qualifications; and (3) direct the FCC to grant multiple PCN licenses in each of the top ninety markets no later than 18 months following the date of enactment of S. 218.

I welcomed the opportunity to testify before the Subcommittee and will be pleased to provide the Subcommittee with any additional information that may be helpful in facilitating the passage of S. 218.

Sincerely,

R. CRAIG ROOS,
Executive, Vice-President.

LOCAL AREA TELECOMMUNICATIONS, INC.'S PROPOSED AMENDMENTS TO SECTIONS 4 THROUGH 6 OF S. 218[1]—(BOLD IS DELETED AND ITALIC IS PROPOSED NEW LANGUAGE)

SEC. 4. IDENTIFICATION OF REALLOCABLE FREQUENCIES

(a) IDENTIFICATION REQUIRED.—The Secretary shall, **within twenty-four months after the date of the enactment of this Act,** prepare and submit to the President and the Congress **a report identifying bands of frequencies that—** *the reports required by subsection (d) to identify bands of frequencies that—*

(1) are allocated on a primary basis for Federal Government use and eligible for licensing pursuant to section 305(a) of the Act (47 U.S. C. 305(a));

(2) are not required for the present or identifiable future needs of the Federal Government;

(3) can feasibly be made available, as of the date of submission of the report or at any time during the next fifteen years, for use under the Act (other than for Federal Government stations under such section 305);

(4) will not result in costs to the Federal Government that are excessive in relation to the benefits that may be obtained by non-Federal licensees; and

(5) are most likely to have the greatest potential for productive uses under the Act.

(b) MINIMUM AMOUNT OF SPECTRUM RECOMMENDED.—

(1) IN GENERAL.—**Based on the report required by subsection (a), the** *The* Secretary shall recommend for reallocation, for use other than by Federal Government stations under section 305 of the Act (47 U.S. C. 305), bands of frequencies that span a total of not less than 200 megahertz, that are located below 5 gigahertz, and that meet the criteria specified in paragraphs (I) through (4) of subsection (a). If the **report** *Secretary* identifies (as meeting such criteria) bands of frequencies spanning more than 200 megahertz, the **report** *Secretary* shall identify and recommend for reallocation those bands (spanning not less than 200 megahertz) that meet the criteria specified in paragraph (5) of such subsection.

(2) MIXED USES PERMITTED TO BE COUNTED.—Bands of frequencies which the Secretary**'s report** recommends be partially retained for use by Federal Government stations, but which are also recommended to be reallocated to be made available under the Act for use by non-Federal stations, may be counted toward the minimum spectrum required by paragraph (1) of this subsection, except that—

(A) the bands of frequencies counted under this paragraph may not count toward more than one half of the minimum required by paragraph (1) of this subsection;

(B) a band of frequencies may not be counted under this paragraph unless the assignments of the band to Federal Government stations under section 305 of the Act (47 U.S.C. 305) are limited by geographic area, by time, or by other means so as to guarantee that the potential use to be made by such Federal Government stations is substantially less (as measured by geographic area, time, or otherwise) than the potential use to be made by non-Federal stations; and

(C) the operational sharing permitted under this paragraph shall be subject to coordination Procedures which the Commission shall establish and implement to ensure against harmful interference.

(c) CRITERIA FOR IDENTIFICATION.—

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[1] LOCATE does not propose any amendments to Sections 1 through 3 or 7 and 8 of S. 218.

(1) Needs of the Federal Government.—In determining whether a band of frequencies meets the criteria specified in subsection (a)(2), the Secretary shall—

(A) consider whether the band of frequencies is used to provide a communications service that is or could be available from a commercial carrier or other vendor;

(B) seek to promote—

(i) the maximum practicable reliance on commercially available substitutes;

(ii) the sharing of frequencies (as permitted under subsection (b)(2));

(iii) the development and use of new communications technologies; and

(iv) the use of nonradiating communications systems where practicable; and

(C) seek to avoid—

(i) serious degradation of Federal Government services and operations; and

(ii) excessive costs to the Federal Government and civilian users of Federal Government services.

(2) Feasibility of use.—In determining whether a frequency band meets the criteria specified in subsection (a)(3), the Secretary shall—

(A) assume such frequencies will be assigned by the Commission under section 303 of the Act (47 U.S. C. 303) over the course of not less than fifteen years;

(B) assume reasonable rates of scientific progress and growth of demand for telecommunications services;

(C) determine the extent to which the reallocation or reassignment will relieve actual or potential scarcity of frequencies available for licensing by the Commission for non-Federal use;

(D) seek to include frequencies which can be used to stimulate the development of new technologies; and

(E) consider the cost to reestablish services displaced by the reallocation of spectrum.

(3) Commerical use.—In determining whether a band of frequencies meets the criteria specified in subsection (a)(4), the Secretary shall consider—

(A) the extent to which equipment is available that is capable of utilizing the band;

(B) the proximity of frequencies that are already assigned for commercial or other non-Federal use; and

(C) the activities of foreign governments in making frequencies available for experimentation or commercial assignments in order to support their domestic manufacturers of equipment.

(4) Other uses.—

(A) Applicability of criteria.—The criteria specified by section 4(a) shall be deemed not to be met for any purpose under this Act with regard to any frequency assignment to, or any frequency assignment used by, a Federal power agency for the purpose of withdrawing that assignment.

(B) Mixed use eligibility.—The frequencies assigned to any Federal power agency may only be eligible for mixed uses under subsection (b)(2) in geographically separate areas, but in those cases where a frequency is to be shared by an affected Federal power agency and a non-Federal user, such use by the non-Federal user shall not cause harmful interference to the affected Federal power agency or adversely affect the reliability of its power system.

(C) Definition.—As used in this paragraph, the term "Federal power agency" means the Tennessee Valley Authority, the Bonneville Power Administration, the Western Area Power Administration, or the Southwestern Power Administration.

(d) Procedure for identification of reallocable bands of frequencies.—

(1) Submission of preliminary identification to Congress.—

(1) Submission of reports to the Congress and the President to identify 140 MHz to be made available immediately for reallocation to personal communications services and to identify additional frequencies to be reallocated.

(A) Within six months after the date of enactment of this Act, the Secretary shall prepare and submit to the Congress and the President a report which specifically identifies 140 MHz of spectrum, to be made available for reallocation to personalized communications services, including personal communications networks, upon issuance of this report, and to be distributed by the Commission pursuant to the expedited, comparative procedures established by the Commission under subsection 6(a)(1)(A).

(B) Within twelve months after the date of the enactment of this Act, the Secretary shall prepare and submit to the Congress a report which makes a preliminary identification of reallocable bands of frequencies which meet the criteria established by this section *(which shall include the 140 MHz previously identified under subsection (d)(1)(A)).*

(C) The Secretary shall publish the reports required by this section in the Federal Register.

(2) CONVENING OF ADVISORY COMMITTEE.—Not later than **the date the Secretary submits the report required by paragraph (1)** *twelve months after enactment of this Act,* the Secretary shall convene an advisory committee to—

(A) review the bands of frequencies identified in such report;

(B) advise the Secretary with respect to (i) the bands of frequencies which should be included in the final report required by subsection **(a)** *d(1) (B),* and (ii) the effective dates which should be established under subsection (e) with respect to such frequencies;

(C) receive public comment on the Secretary's report and on the final report; and

(D) prepare and submit the report required by paragraph *(d)(4) of section 4.*

The advisory committee shall meet at least monthly until each of the actions required by section 5(a) have taken place.

(3) COMPOSITION OF COMMITTEE; CHAIRMAN.—The advisory committee shall include—

(A) the Chairman of the Commission and the Assistant Secretary of Commerce for Communications and Information, and one other representative of the Federal Government as designated by the Secretary; and

(B) representatives of—

(i) United States manufacturers of spectrum-dependent telecommunications equipment;

(ii) commercial carriers;

(iii) other users of the electromagnetic spectrum, including radio and television broadcast licensees, State and local public safety agencies and the aviation industry; and

(iv) other interested members of the public who are knowledgeable about the uses of the electromagnetic spectrum.

A majority of the members of the committee shall be members described in subparagraph (B), and one of such members shall be designated as chairman by the Secretary.

(4) RECOMMENDATIONS ON SPECTRUM ALLOCATION PROCEDURES.—The advisory committee shall, not later than **thirty-six** *twenty-four* months after the date of the enactment of this Act, submit to the Secretary, the Commission, the Committee on Energy and Commerce of the House of Representatives, and the Committee on Commerce, Science, and Transportation of the Senate, a report containing such recommendations as the advisory committee considers appropriate for the reform of the process of allocating the electromagnet spectrum between Federal and non-Federal use, and any dissenting views thereon.

(e) TIMETABLE FOR REALLOCATION AND LIMITATION.—The Secretary shall, as part of the report required by subsection **(a)** *d(1)(8),* include a timetable that recommends immediate and delayed effective dates by which the President shall withdraw or limit assignments on the frequencies specified in the report. The recommended delayed effective dates shall—

(1) permit the earliest possible reallocation of the frequency bands, taking into account the requirements of section 6(C)(1);

(2) be based on the useful remaining life of equipment that has been purchased or contracted for to operate on identified frequencies;

(3) be based on the need to coordinate frequency use with other nations; and

(4) take into account the relationship between the costs to the Federal Government of changing to different frequencies and the benefits that may be obtained from commercial and other non-Federal uses of the reassigned frequencies.

SEC. 5. WITHDRAWAL OF ASSIGNMENT TO FEDERAL GOVERNMENT STATIONS

(a) IN GENERAL.—The President shall—

(1) Within three months after receipt of the Secretary's report under subsection 4(d)(1)(A), withdraw the assignment to a Federal Government station of any frequency on the 140 MHz which the report identifies for immediate reallocation to personalized communications services including personalized communications networks.

(1) Within six months after receipt of the Secretary's report under section 4(a), withdraw the assignment to a Federal Government station of any frequency which the report recommends for immediate reallocation;

(2) Within such six-month period, limit the assignment to a Federal Government station of any frequency which the report recommends be made immediately available for mixed use under section 4(b)(2);

(3) *(2) with respect to other frequencies recommended for reallocation in the Secretary's report required under subsection 4(d)(1)(B),* by the delayed effective date recommended by the Secretary under section 4(e) (except as provided in subsection (b)(4) of this section), withdraw or limit the assignment to a Federal Government station of any frequency which the report recommends be reallocated or made available for mixed use on such delayed effective date;

(4) *(3)* assign or reassign other frequencies to Federal Government stations as necessary to adjust to such withdrawal or limitation or assignments; and

(5) *(4)* transmit a notice and description to the Commission and each House of Congress of the actions taken under this subsection.

(b) EXCEPTIONS.—

(1) AUTHORITY TO SUBSTITUTE.—If the President determines that a circumstance described in paragraph (2) exists, the President—

(A) may *may within one month after receipt of the Secretary's report under section 4(d)(1)(A), and within six months from the receipt of the Secretary's report under 4(d)(1)(B),* substitute an alternative frequency or band of frequencies for the frequency or band that is subject to such determination and withdraw (or limit) the assignment of that alternative frequency or band in the manner required by subsection (a); and

(B) shall submit a statement of the reasons for taking action described in subparagraph (A) to the Committee on Energy and Commerce of the House of Representatives, and the Committee on Commerce, Science and Transportation of the Senate.

(2) GROUNDA FOR SUBSTITUTION.—For purposes of paragraph (1), the following circumstances are described in this paragraph:

(A) the reassignment would seriously jeopardize the national defense interest of the United States;

(B) the frequency proposed for reassignment is uniquely suited to meeting important governmental needs;

(C) the reassignment would seriously jeopardize public health or safety; or

(D) the reassignment will result in costs to the Federal Government that are excessive in relation to the benefits that may be obtained from commercial or other non-Federal uses of the reassigned frequency.

(3) CRITERIA FOR SUBSTITUTED FREQUENCIES.—For purposes of paragraph (1), a frequency may not be substituted for a frequency identified by the report of the Secretary under section 4(a) *4(d)(1)(B)* unless the substituted frequency also meets each of the criteria specified by section 4(a).

(4) DELAYS IN IMPLEMENTATION.—If the President determines that any action cannot be completed by the delayed effective date recommended by the Secretary pursuant to section 4(e), or that such an action by such date would result in a frequency being unused as a consequence of the Commission's plan under section 6, the President may—

(A) withdraw or limit the assignment to Federal Government stations on a later date that is consistent with such plan, except that the President shall notify each Committee specified in paragraph (1)(B) and the Commission of the reason that withdrawal or limitation at a later date is required; or

(B) substitute alternative frequencies pursuant to the provisions of this subsection.

(c) LIMITATION ON DELEGATION.—Notwithstanding any other provision of law, the authorities and duties established by this section may not be delegated.

SEC. 6. DISTRIBUTION OF FREQUENCIES BY TEE COMMISSION

(a) Distribution of frequencies to personal communications services.—

(1) With respect to the 140 MHz to be reallocated from Federal use to personalized communications services, including personalized communications networks, under section 4(d)(1)(A), and pursuant to its authority under section 309 of the Communications Act of 1934, as amended, the Commission shall—

(A) not later than twelve months after enactment of this Act, following public notice and comment proceedings, adopt rules establishing procedures to grant licenses for the provision of personalized communications services, including the operation of personalized communications networks, on the 140 MHz of spectrum identified for reallocation under subsection 4(d)(1)(A) based on an expedited and comparative analysis of the qualifications of the license applicants which analysis shall include favorable consideration of the applicants' evaluation and testing of personal communications services and personalized communications network technologies pursuant to experimental authorization from the Commission.

(B) not later than eighteen months after enactment of this Act, identify the top ninety markets for personalized communications services, including personalized communications networks, in the DAted States and grant licenses for the provision of such services and the operation of such networks to qualified applicants in each of the top ninety markets identified by the Commission pursuant to this subsection.

Not later than one year after the President notifies the Commission pursuant to section 5(a)(5),

(C) With respect to the remaining spectrum to be reallocated from Federal use to non-Federal use under section 4(e), not later than twenty-four months after issuance of the report required by subsection 4(d)(1)(9), the Commission shall prepare, in consultation with the Assistant Secretary of Commerce for Communications and Information when necessary, and submit to the President and the Congress, a plan for the distribution under the Act of the frequency bands reallocated pursuant to the requirements of this Act. Such plan shall—

(1) not propose the immediate distribution of all such frequencies but, taking into account the timetable recommended by the Secretary pursuant to section 4(e) shall propose—

(A) gradually to distribute the frequencies remaining, after making the reservation required by subparagraph (B), over the course of a period of not less than 10 years beginning on the date of submission of such plan; and

(B) to reserve a **significant** portion of such frequencies for distribution beginning after the end of such 10 year period;

(2) contain appropriate provisions to ensure—

(A) the availability of frequencies for new technologies and services in accordance with the policies of section 7 of the Act (47 U.S.C. 157); and

(B) the availability of frequencies to stimulate the development of such technologies;

(3) address (A) the feasibility of reallocating portions of the spectrum from current commercial and other non-Federal uses to provide for more efficient use of the spectrum, and (B) innovation and marketplace developments that may affect the relative efficiencies of different spectrum allocations; and

(4) not prevent the Commission from allocating bands of frequencies for specific use in future rulemaking proceedings.

PREPARED STATEMENT OF MS. PATRICIA M. WORTHY

My name is Patricia M. Worthy and I am the Chairman of the District of Columbia Public Service Commission. I also serve as the Chair of the Committee on Communications and as a member of the Executive Committee of the National Association of Regulatory Utility Commissioners (NARUC) on whose behalf I submit this statement for the record today.

As you may know, the NARUC is a quasi-governmental nonprofit organization founded in 1889. Within our membership are the governmental agencies of the fifty states, the District of Columbia, Puerto Rico and the Virgin Islands which are engaged in the regulation of utilities and carriers. Our chief objective is to serve the consumer interest by seeking to improve the quality and effectiveness of government regulation in America. More specifically, the NARUC is composed of, inter alia, State and territorial officials charged with the duty of regulating the telecommunications common carriers within their respective borders. As such, they have the obligation to assure the establishment of such telecommunications services and facilities as may be required by the public convenience and necessity, and the furnishing of service at rates that are just and reasonable.

The NARUC supports S. 218, the Emerging Telecommunications Technologies Act of 1991, in principle, and its attempt to encourage spectrum allocations to allow for the sharing of existing spectrum and support for Federal funds to bear all reasonable costs of reclaiming frequencies. We also feel that spectrum planning should be encouraged with respect to the future spectrum requirements for public and private uses. At our recent Winter Meeting in 1991 and our Annual Meeting in 1990, the NARUC Executive Committee adopted resolutions in support of these attempts (Appendix A).

The NARUC feels, however, strongly that State regulators must be included in the membership of the advisory committee on identifying frequencies for reallocation (S. 218, Section 4(C)(3)). These important decisions will have wide reaching impact for each State, as well as the Nation. Therefore, we hereby request that any revisions of S. 218 include State regulatory officials among the committee membership.

Currently, we are witnessing a tremendous growth in the field of communications. Services that could not have even been conceived of over the past decades are well on their way to being made available to consumers. Such advanced technology includes Personal Communications Services (PCSs) and Personal Communications Networks (PCNs). PCSs include a broad range of radio services that free individuals from the wireline public switched telephone network and enable communications away from the home or office telephones. Basic forms of these services include the current cordless telephone and paging devices. Car telephone services represent a more advanced form of such services. Public demand has begun to appear for even more advanced forms of PCSs such as hand-held portable phones that allow individuals to call or be called any time they are within a cellular system. It is a movement away from a station-to-station communications approach toward person-to-person services. Privacy will be increased in the future as these systems become digital with expanded capacity. Interest in PCSs is global in nature, with Europe, especially the United Kingdom, Canada and Japan acting to bring these services to consumers. The NARUC supports the development of PCNs and PCSs.

Here at home, the Federal Communications Commission (FCC), initiated a Notice of Inquiry on June 14, 1990, to gather information to develop regulatory policies concerning the possible implementation of policies regarding PCSs and PCNs. The FCC allocates and assigns spectrum for nongovernmental use. The Commission has already divided the electromagnetic spectrum into bands for different types of users. Virtually all of the usable spectrum has been allocated. Accordingly, due to the limited spectrum available and the increasing demands for such new services, the NARUC believes that spectrum frequencies should be allocated to multiple providers to be shared with existing frequency users to encourage the development of PCNs and PCSs.

The NARUC believes that PCS providers must be regulated as common carriers and required to provide all services on an unbundled, non-discriminatory basis to all potential users and to adhere to uniform technical and minimum service standards. Also, States should be allowed to regulate the intrastate rates, terms and geographic territories if they deem necessary. It is imperative that State and Federal regulators work together to effectively implement these services to the consumer. In conclusion, the NARUC supports the spectrum planning, the shared use of existing spectrum and Federal monies to bear all reasonable costs of reclaiming frequencies.

Thank you for your attention.

THE NARUC PROPOSED AMENDMENT TO S. 218, THE EMERGING TELECOMMUNICATIONS TECHNOLOGIES ACT OF 1991

The National Association of Regulatory Utility Commissioners (NARUC) respectfully requests that the above bill be amended as follows by:

Inserting between line 5 and line 6, page 12, a paragraph as follows:

"(v) State regulatory utility commissioners selected alter consultation with the national organization of State commissioners."

APPENDIX A

Resolution to Further Expand NARUC's Position on the Establishment of Personal Communication Networks (PCNs)/Personal Communication Services (PCSs)

Whereas, The Federal Communications Commission (FCC) has chosen to investigate the development and implementation of new PCSs and PCNs; and

Whereas, The 102nd Congress is considering H.R. 531, introduced January 15, 1991, to establish procedures to improve the allocation and assignment to the electromagnetic spectrum; and

Whereas, The National Association of Regulatory Utility Commissioners (NARUC) at its 102nd Annual Convention adopted a resolution that encourages the FCC to develop PCNs/PCSs and states the NARUC position on issues regarding PCNs/PCSs; and

Whereas, The FCC Notice of Inquiry is requesting comments and information on PCNs/PCSs services, which some commentators allege may be less than state of the art; and

Whereas, Some proposals for PCNs/PCSs numbering departs from existing numbering schemes and may create confusion for consumers; and

Whereas, There is a concern that the Bellcore's administration of the numbering plan may be hindering competition in the provisioning of PCN services; and

Whereas, The building of intelligent PCNs/PCSs that utilize the existing various communications infrastructure offers the potential to minimize deployment cost, encourage ubiquity, and maximize communication services to the public; and

Whereas, The NARUC, in its previous resolution on this matter supported spectrum sharing and H.R. 531, encourages spectrum sharing and frequency reallocation; and

Whereas, Some parties who already may have under utilized existing spectrum have claimed that the spectrum sharing and reallocation will cause them an increased cost of doing business; and

Whereas, H.R. 531 proposes to appropriate monies to bear all costs of reclaiming frequencies; and

Whereas, Interconnectability and unbundled functionality of all parts of the PCNs/PCSs may provide numerous benefits to society: reduced cost to consumers because of mass production economies of scale, accelerated deployment because of broad market availability, utility of the service because of wide geographical access and acceptance, and feature familiarity in multiple environments and applications; now, therefore, be it

Resolved, That the Executive Committee of the National Association of Regulatory Utility Commissioners (NARUC), convened at its Winter Meeting in Washington, D.C., encourages the FCC to promote interconnectability of PCNs/PCSs technology with existing communications and cellular networks; and be it further

Resolved, That the development of global interconnection standards including common air interface protocols, network interfaces and compatibility, validation and registration, interoperability, intersystem handoff, performance standards, and modification of existing telecommunications standards governing switching, common channel signalling and billing, be addressed by the appropriate industry and user committees; and be it further

Resolved, That there be assurances in the development of these standards that the new PCNs/PCSs will provide state of the art service; and be it further

Resolved, That the interconnection standards promote unbundling of all functionalities including the telephone sets and providers throughout the system, from the towers to networks and to the PCS devices; and be it further

Resolved, That spectrum allocations be made to allow for sharing of existing spectrum and support for Federal funds to bear all reasonable costs of reclaiming frequencies; and be it further

Resolved, That spectrum planning should be encouraged with respect to the future spectrum requirements for public and private uses.

Resolution Concerning the FCC Rules to Establish New Personal Communications Services in Gen. Docket No. 90–314, RM–71 40 & RM–7175

Whereas, The Federal Communications Commission (FCC) has chosen to investigate the development and implementation of new Personal Communications Services (PCSs) and Personal Communications Networks (PCNs) in Gen. Docket No. 90-314,RM-7140 & RM-71 75; and

Whereas, Comments on this Notice were due on or before October 1,1990 and Reply Comments are due on or before November 30, 1990; and

Whereas, The FCC is specifically requesting information to determine which new PCSs are needed, where in the spectrum those services should be provided if at all, how much spectrum should be allocated to them, whether and how the services should be regulated, and what technical standards should be adopted; and

Whereas, The FCC will also be addressing two petitions for rule making, from Cellular 21, Inc. and PCN America, Inc., that propose establishment of particular types of PCSs; and

Whereas, PCSs include a broad range of radio communications services that free individuals from the constraints of the wireline public switched telephone network and enables communications away from home or office telephones; and

Whereas, Basic forms of these services include the current cordless telephone and paging devices, while car telephone services represent a more advanced form of PCSs; and

Whereas, Public demand has begun to appear for even more advanced forms of PCSs; and

Whereas, Hand-held portable telephones enable individuals to call or be called at any time they are within a cellular system, as opposed to car installed telephones; and

Whereas, The next generation of PCSs being developed today appears to be moving towards person-to-person, instead of station-to-station, communications; now therefore be it

Resolved, That the National Association of Regulatory Utility Commissioners (NARUC), convened in its 102nd Annual Convention in Orlando, Florida, encourages the FCC to allow the development of Personal Communication Services (PCSs) and Personal Communication Networks (PCNs) by allocating spectrum frequencies to be shared with existing frequency users; and be it further

Resolved, That the applicant who receives the new allocations should be required to provide common carriage on an unbundled basis in accordance with uniform technical standards and minimum service standards established for service provisioning; and be it further

Resolved, That States should be allowed to regulate the intrastate rates, terms and geographic service territories if they deem necessary; and be it further

Resolved, That both State and federal regulators should work together to develop methods for service monitoring; and be it further

Resolved, That the FCC should allocate spectrum to multiple providers and State commissions be allowed to regulate franchises; and be it further

Resolved, That authorized service providers in a given geographic area should not be affiliated with one another; and be it further

Resolved, That these service providers should be regulated as common carriers and should be required to offer all services on a publicly-available, unbundled, nondiscriminatory basis to all potential users. State Commissions should not be preempted from regulating PCSs/PCNs because these services/ networks represent a communications public system, offered by a service provider for the purpose of providing local communications. PCSs/PCNs should be viewed as a complementary method of providing the services currently offered by local exchange carriers, and the same type of regulations should continue to apply to these like services; and be it further

Resolved, That the local wireline carrier in the market area should not be precluded by rules established in this proceeding from being an authorized service provider; and be it further

Resolved, That the service provider must allow access to all local and interexchange/toll carriers, and that all emergency calls must be routed in the fastest possible way to the proper local emergency service provider; and be it further

Resolved, That the FCC should consider that regional or local market size should represent the most appropriate priority sequence for the availability of licenses for PCS/PCN service providers; and be it further

Resolved, That the NARUC General Counsel file comments with the FCC to express the concerns of NARUC regarding the development of PCNs and PCSs.

LETTER FROM MR. CHARLES M. MEEHAN, EXECUTIVE DIRECTOR AND GENERAL COUNSEL, UTILITIES TELECOMMUNICATIONS COUNCIL, TO SENATOR INOUYE

FEBRUARY 21, 1991.

The Honorable DANIEL K. INOUYE,
U.S. Senate,
Washington, DC 20510–6130

DEAR MR. CHAIRMAN: The Utilities Telecommunications Council ("UTC") is pleased to submit the following comments on the "Emerging Telecommunications Technologies Act of 1991" (S. 218). UTC's concerns are limited to the potentially disruptive effect implementation of this bill could have on the nation's critical energy and water delivery systems.

BACKGROUND

UTC is the national representative on telecommunications matters for the nation's electric, gas, water and steam utilities ("Utilities"). UTC's members range in size from large combination electric-gas-water systems serving millions of consumers, to small rural electric cooperatives and water districts serving only a few thousand residents.

On August 3, 1990, UTC submitted comments to the Subcommittee on the predecessor bill, S. 2900. At that time, UTC expressed concern that the bill's emphasis on "commercial carriers" and "commercial uses" could be misinterpreted as a policy determination that entitles having communications requirements should look to common carriers or other commercial vendors to satisfy those requirements. UTC noted that such a policy could have a serious adverse impact on the reliability of the telecommunications systems of Federal power entities, such as the Tennessee Valley Authority (TVA), the Bonneville Power Administration (BPA), and the Western Area Power Administration (WAPA). UTC was also concerned that the bill's emphasis on making spectrum available for "commercial" operations, such as Personal Communications Networks, would be at the expense of existing utility users which depend on their private land mobile and microwave systems for the safe and reliable delivery of energy to the American public.

PROTECTION FOR FEDERAL POWER AGENCIES

UTC is very pleased to see that the bill, as reintroduced, recognizes the criticality of the private communications systems operated by the Federal power agencies by restricting the Secretary of Commerce from withdrawing frequency assignments used by the Federal power agencies.[1] UTC agrees with your statement on introducing this bill that "some frequencies must remain clear for emergency and public safety purposes."[2] Spectrum used by the Federal power agencies, as well as private sector utilities, clearly falls in this category.

NEUTRALITY IN SPECTRUM REALLOCATIONS

UTC is also pleased that S. 218 places less emphasis on "commercial users" of spectrum, and generally employs the more neutral term, "non-Federal users," when referring to the potential beneficiaries of any spectrum reallocations.[3] This change is consistent with the intention, expressed in your statement, that the "bill expresses no opinion on which particular members of the public should be awarded the right to operate over these new frequencies or which particular uses should be made of the new frequencies."[4] Elimination of the "commercial uses" language will assure that all private sector spectrum users, including public service utilities, will be given equal consideration for any unused government spectrum which might be reallocated as a result of this bill.

UTILITIES CANNOT RELY ON "COMMERCIAL CARRIERS"

UTC is still concerned with one aspect of the bill; namely, the directive that Federal government radio users should rely on "commercial carriers or other vendors." For example, Section 2 of the bill includes a Finding that government frequencies are being assigned for services that could be obtained more efficiently from commercial carriers or other vendors." Likewise, Section 4(c)(1) of the bill provides that, in determining whether a government frequency will no longer be required for present or future government needs, the Secretary of Commerce shall:

(A) consider whether the band of frequencies is used to provide a communications service that is or could be available from a commercial carrier or other vendor; [and]

(B) seek to promote—

(i) the maximum practicable reliance on commercially available substitutes; * * *

The bill would thus require Federal government users to demonstrate that their telecommunications needs could not be met by "commercial carriers or other vendors" as a condition of retaining their proprietary microwave or land mobile radio systems. UTC is very troubled by the concept of forcing a user, such as TVA, BPA or WAPA, to rely on the services of commercial communications providers. While the reallocation formulas of S. 218 impose this requirement only with respect to Federal government users, this policy could just as easily be applied by analogy to frequency allocations or licensing decisions by the Federal Communications Commission (FCC) in the private sector.

Utilities (both Federal and non-Federal) depend on private land mobile and microwave radio systems because they provide a highly reliable telecommunications service under the utility's complete control. Utilities, whether Federal or private sector, should not be forced to rely on common carriers or other commercial vendors for their vital communications requirements. Private land mobile radio facilities are used for crew dispatch and for some automated distribution functions. Private microwave systems have become essential elements in the utilities' communications plans, and are used to carry voice and data services between utility control centers, headquarters, data centers, power plants, and other utility facilities.

The need by utilities for reliable, private systems has been repeatedly demonstrated. For example, in its April 1, 1985, *First Report and Order* in PR Docket No. 83-426, dealing with private microwave service rules, the FCC found that "Power companies demand a reliability factor of 99.995 percent * * * which is higher than the level of reliability for most common carrier services."

In the Three-Mile Island (TMI) incident, the utility could not secure adequate common carrier services due to overload of the local telephone central office circuits. However, because the plant operator had installed a private microwave system which interconnected with the public telephone network at a distant telephone company central office, the utility was still able to pass critical information into and out of the nuclear plant. The TMI incident dramatically confirmed that the choice of communications technology (e.g., microwave, fiber or satellite) must be in the hands of the utility.

Hurricane Hugo and the October, 1989, Loma Prieta earthquake dramatically confirmed the need for utilities to have proprietary land mobile and microwave systems free from the "traffic saturation" typically experienced on public communications networks, including cellular telephone systems, during such emergencies. In these situations, where utility crews are working round-the-clock to restore vital public services, utilities cannot "compete" with the increased volume of non-utility traffic on public communications networks. With private land mobile or microwave systems, utilities are able to dispatch crews, coordinate service restoration, and communicate with civil defense and public safety officials without delay or interruption.

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[1] *See* Section 4(c)(4).

[2] 137 Cong. Rec. S. 570 (Statement of Sen. Inouye).

[3] *See, e.g.,* Section 4(c)(2)(C).

[4] 137 Cong. Rec. S. 570 (Statement of Sen. Inouye).

In a recent report of the Energy Task Force of the President's National Security Telecommunications Advisory Committee (NSTAC), it was acknowledged that the public telecommunications networks are highly reliant on commercial electric power.[5] However, the power industry is not equally dependent on the PSTN because energy utilities' critical communications systems are privately owned and operated. The Report also found the PSTN does not have enough backup power or fuel storage capacity to operate through normal power outages, and the situation will probably deteriorate due to new underground fuel storage regulations of the Environmental Protection Agency.

The lack of electric power or fuel supplies to the PSTN following severe and catastrophic disasters is as much of a threat to the telecommunications system as the disasters themselves. The NSTAC Report notes that the level of telecommunications operability due to power outages probably will not be adequate enough to ensure uninterrupted telecommunications to National Security and Emergency Preparedness users. Thus, energy utilities are in a much better position to respond to and recover from catastrophic emergencies due to their private telecommunications systems. The NSTAC Report confirms that energy utilities cannot rely on commercial carriers or other vendors because if there is a general power outage, both systems might be inoperable, thereby compounding service restoration problems.

With this as background, it is clear that any restriction on a utility's ability to obtain and operate private communications facilities would threaten the reliability and safe functioning of the underlying utility system. If utilities are unable to secure radio frequencies for their proprietary communications systems, they will be restricted to using whatever services might be available from the local common carrier. Even assuming the local telephone company makes available the proper mix of services, the utility will be at the mercy of the telephone company should an emergency (such as a hurricane earthquake or terrorist attack) disrupt the utility's leased circuits.

UTC understands that the Federal government currently places heavy reliance on the private sector in providing telecommunications service for its own use. Federal users are already required to use commercial services except where such service is: (a) not available to the use during the time needed; (b) not adequate from either a technical or operational standpoint; or (c) significantly more costly.[6] The Subcommittee should therefore clarify that the bill's reference to government reliance on "commercial carriers or other vendors" is merely a recodification of existing spectrum allocation policy, and is not intended as a new requirement on Federal government users of the radio spectrum.

CONCLUSION

In conclusion, UTC supports the provisions of S. 218 that recognize the need of the Federal power agencies to operate proprietary microwave and land mobile radio systems. If energy utilities, whether Federal government or private sector, are to provide safe and reliable service to the American public, it is critical that they continue to have access to sufficient radio spectrum to meet their internal operating requirements. UTC therefore urges the Subcommittee to clarify that the bill's reference to "commercial carriers or other vendors" will not require Federal power agencies to abandon their very efficient and reliable microwave or land mobile radio systems.

UTC is pleased to have the opportunity to present these comments, and would welcome any further questions you, your colleagues or staff may have on this matter.

Very truly yours,

CHARLES M. MEEHAN,
Executive Director and General Counsel.

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[5] *See* "Final Report of the Energy Task Force of the National Security Telecommunications Advisory Committee" (February 1990).

[6] *NTIA Telecom 2000: Charting the Course for a New Century* (October 1988), p. 376.

LETTER FROM MR. JOHN N. ROSE, EXECUTIVE VICE PRESIDENT, ORGANIZATION FOR THE PROTECTION AND ADVANCEMENT OF SMALL TELEPHONE COMPANIES

APRIL 18, 1991.

The Honorable DANIEL K. INOUYE,
U.S. Senate,
Washington, DC 20510

DEAR MR. CHAIRMAN: I am writing to inform you that the Organization for the Protection and Advancement of Small Telephone Companies (OPASTCO) enthusiastically supports S. 218, the "Emerging Telecommunications Technologies Act of 1991." OPASTCO applauds your efforts to both increase the efficiency of U.S. spectrum management and make innovative new services available to American consumers.

Our members currently provide spectrum-dependent services in several different capacities. Many of them operate cellular telephone systems. Others incorporate radio into the public switched telephone network in the form of microwave links and Basic Exchange Telecommunications Radio Service. These are all examples of the use of the latest technology to bring telecommunications services to remote areas of the country. In the future, OPASTCO members hope to also provide rural America with personal communications services (PCS) such as telepoint systems and wireless PBXs.

As current spectrum users, OPASTCO members understand first hand the seriousness of the scarcity of available spectrum. Your bill will greatly facilitate the introduction of advanced new communications services, ensuring this country's continued technological leadership.

However, that leadership will not be assured by another proposal your subcommittee is facing: licensing by "competitive bidding," or spectrum auctions. OPASTCO is strongly opposed to the concept of spectrum auctions, and will oppose any legislation containing auction language, such as H.R. 1407.

The last two administrations have repeatedly promoted the idea of changing the Federal Communications Commission's policy of licensing electromagnetic spectrum by allowing the FCC to auction portions of the spectrum to the highest bidder. This would not only raise a significant amount of money for the federal government, proponents of such a plan insist, but would create a more efficient system of spectrum management.

Proponents of spectrum auctions, including the National Telecommunications and Information Administration and the sponsors of H.R. 1407, insist that adequate safeguards can be included in the proposal to ensure that small companies are still able to participate. OPASTCO does not believe that this is the case. For example, allowing the winning bidder in an auction situation to pay his bid over time does not change the fact that large regional or national companies still have much "deeper pockets" than smaller local ones.

OPASTCO firmly believes that: 1) spectrum auctions would preclude small and rural companies from providing new services based solely on their inability to outbid large, wealthy companies (a development not in the public interest); and 2) spectrum auctions involve a fundamental shift in longstanding national communications policy, and, if the proposal is to be considered at all, it should be considered separately from your spectrum reallocation bill.

Again, OPASTCO strongly supports S. 218, and urges the subcommittee to approve it without the inclusion of auction language.

Sincerely,

JOHN N. ROSE,
Executive Vice President.

LETTER FROM MR. EDWARD O. FRITTS, PRESIDENT AND CEO, NATIONAL ASSOCIATION OF BROADCASTERS

APRIL 23, 1991.

The Honorable DANIEL K. INOUYE,
U.S. Senate,
Washington, DC 20510

DEAR CHAIRMAN INOUYE: The National Association of Broadcasters (NAB) appreciates this opportunity to provide our views on S. 218, the Emerging Telecommunications Technologies Act of 1991.

The NAB strongly supports enactment of S. 218. In our January, 1991 Board meeting a resolution of support for this bill was unanimously approved. A copy of that resolution is attached for your information. It is our view that S. 218 is an innovative approach to reducing the continuing crisis over spectrum allocation decisions. We recognize that delivery of High Definition Television (HDTV) and Digital Audio Broadcasting (DAB), may necessitate increased spectrum demands or changes in current spectrum usage. In either case, we believe that enactment of S. 218 will ease the transition to these improved audio and video transmission systems.

It seems very clear that the issue which may dominate the consideration of this important proposal is some form of spectrum auction or "competitive bidding." As you may know, NAB opposes the auctioning of spectrum dedicated to broadcast use. NAB views the imposition of an auction as a significant alteration to the current "contract" between local broadcasters and the federal government. In exchange for the assignment of a specific frequency by the government, broadcasters pledge to provide a measure of public service to their local communities. In addition, unlike other users of spectrum, broadcasters provide their programming services to the public free of charge. This "contract" has served local communities, the nation and broadcasters quite well.

We understand that the Subcommittee intends to bold her bearings on the auctions issue. NAB will be happy to expand upon our concerns regarding auctions at that time.

Enactment of S. 218 is vitally important to future, effective use of the spectrum. We are prepared to work with you and others in securing passage of S. 218.

Sincerely,

EDWARD O. FRITTS.

SPECTRUM ALLOCATION LEGISLATION

Whereas, Representative John Dingell and Senator Daniel Inouye have introduced legislation to provide additional spectrum for commercial usage, and

Whereas, such legislation could help reduce competing claims for spectrum, and

Whereas, such legislation could aid radio and television broadcasters who seek to provide digital audio broadcast or advanced television service,

Therefore by it resolved, That the NAB strongly supports early passage of H.R. 531 and S. 218 and urges President Bush to approve the Emerging Telecommunications Technologies Act of 1991.

BEFORE THE FEDERAL COMMUNICATIONS COMMISSION, WASHINGTON, DC 20554

In the Matter of Amendment of the Commission's Rules To Establish New Personal Communications Services—Gen. Docket 90–314, RM–7140, RM–7175

REPLY COMMENTS

American Telephone and Telegraph Company ("AT&T") respectfully submits the following Reply Comments in response to the comments[1] submitted on October 1, 1990 in response to the Commission's Notice of Inquiry ("NOI"), FCC 90–232, released June 28, 1990, concerning personal communications services ("PCS").

I. THE COMMISSION SHOULD ADOPT ITS PROPOSED "CO-PRIMARY", MARKETPLACE-BASED APPROACH TO SPECTRUM ALLOCATION AND COORDINATION

The single most important issue identified in the comments is the allocation of spectrum for PCS. The Commission's marketplace approach would best serve the public interest, and should be adopted to address this problem. Alternatives proposed in the comments would substitute cumbersome and costly regulatory processes that would delay implementation of PCS and would deny consumers the benefits of full competition in the development of PCS services, technologies and providers.

A. THE MARKETPLACE-BASED SYSTEM WILL RESOLVE ISSUES BETWEEN CONFLICTING USES AND PROVIDERS AND MINIMIZE ADMINISTRATIVE COSTS AND DELAYS

AT&T and many other commenters confirm the Commission's view that demand for PCS is growing and that planning the introduction of PCS should begin at this time.[2] AT&T and several other commenters[3] also supported the Commission's proposal (NOI at para. 22) that the all-important issues of spectrum use be resolved by marketplace means. Some commenters, however, expressed concern that they would lose their existing valuable spectrum rights,[4] despite the fact that the Commission's proposal specifically protects existing users (NOI at para. 22). PCS licenses would be granted on a co-primary basis. Each PCS licensee desiring spectrum now otherwise used by "grandfathered" incumbents would have to negotiate coordination agreements with the incumbent service providers. In this way, valuable existing spectrum uses can continue without being arbitrarily displaced by a blanket reallocation of spectrum to PCS.

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[1] Comments were submitted by the parties listed in Appendix A hereto.

[2] *See, e.g.,* AT&T (at 2-4); APC, at 1, 4-5; Ameritech, at 8; BellSouth, at 4-9; Cox, at 1-2; PCN America, at 2, 5-12. *See also Wall Street Journal,* Friday, Nov. 9, 1990, at R1 *et seq.; Financial Times,* Monday, Oct. 15, 1990, at Section 3.

[3] *See e.g.,* LiTel, at 23 n.39; Digital Microwave, at 4; UTC, at 48-53. *See also* Ameritech, at 4, 16-17.

ATE opposes proposals that ignore marketplace incentives and rely on detailed regulatory determinations. The Commission should reject proposals such as those advanced by LiTel (at 39-40), APC (at 25-26) and PCN America (at 31-33), which generally call for comparative hearings prior to frequency coordination to choose a limited number of PCS providers in various broad geographical regions across the country.[5] Under those proposals, only the few initially licensed PCS providers (and hence, only a few PCS technologies) would be allowed to engage in the PCS business. By contrast, as AT&T's Comments (at 3-6) showed, a determination of the specific types and amounts of PCS services and technologies that the public will need should be left to marketplace forces.[6] A marketplace approach would allow much greater flexibility for PCS to be implemented initially, and to develop over time in response to technological changes and changes in customer demand. No one would be precluded from providing PCS.

Moreover, the bureaucratic solution advanced by LiTel, APC, and PCN America seems likely to reproduce the cost, burden and turmoil that the Commission experienced in the cellular licensing process. As PCN America itself recognizes (at 32-33) the "licensing of cellular providers in each MSA and RSA has been an extremely slow process. The FCC adopted rules to implement cellular service in 1981, and the process of licensing the RSAs is still incomplete." The introduction of cellular technology developed by AT&T was delayed for many years even before 1981 by the regulatory process.[7] Moreover, APC (at 25-26) recognizes that such comparative hearings will "tax the Commission's resources," and recommends that applicants be assessed "substantial filing fees" to cover administrative costs and limit the number of applicants. Instead of adding a complex scheme of comparative hearings, the public interest would best be served by seeking to avoid such administrative cost and delay. A marketplace approach would allow PCS providers who negotiate coordination agreements in any locality (and who meet whatever overall requirements are prescribed by the Commission) to begin providing service promptly.

The Commission's market-based approach can be designed in a way to even further minimize administrative costs and burdens. For instance, AT&T's Comments (at 12-13) envisioned Commission licensing of PCS applicants for nominal spectrum allocations, subject to the applicant subsequently negotiating frequency coordination agreements with incumbent users in broad spectrum bands. By shifting the order of this process—*i.e.*, by requiring applicants *first* to obtain the necessary coordination agreements, and *then* to apply for a Commission license—the number of actual license applications that the Commission would have to process would be reduced. Furthermore, applicants with coordination agreements who meet the Commission's general licensing standards could then be granted a license automatically, without a comparative hearing. Coordinating first would allow the marketplace to do a considerable part of the pre-screening.[8]

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[4] *See, e.g.*, MCI, at 4; California, at 3; LA Sheriff, at 5-9; County of LA, at 5-8; APCO, at 3-9; National Academy of Sciences, at 9-14; API at 46-50.

[5] If, despite AT&T's arguments, the Commission decides to use comparative hearings to limit the number of PCS licensees who will be permitted to enter the market, then the Commission should at least license more than two per region, contrary to the proposals of APC, LiTel and PCN America. In order to accommodate the large numbers of potential PCS providers indicated by the Comments in this docket, at least 8 licensees per region should be licensed.

[6] *Accord, e.g.*, Pacific Telesis, at 18-19; Ameritech, at 3-5.

[7] Indeed, the Commission had allocated spectrum for cellular services as early as 1974. *Land Mobile Radio Service Second Report and Order*, 46 F.C.C.2d 752 (1974) (Docket No. 18262), *recon. granted in part*, 51 F.C.C.2d 945, *clarified*, 55 F.C.C.2d 771 (1975), *aff'd. sub nom. NARUC v. FCC*, 525 F.2d 630 (D.C. Cir. 1976), *cert. denied*, 425 U.S. 992 (1976).

[8] In all events, the Commission will have to establish general standards to screen applicants for citizenship and any other technical requirements (such as guardbands or transmit/receive separation parameters) deemed necessary by the Commission. (*See* 47 C.F.R. 21.4.)

Also, the Commission should limit PCS licensees to a particular quantity of spectrum—perhaps 25 MHz—until the applicant demonstrates to the Commission a need for more spectrum for its particular PCS application(s). 25 MHz is the amount of spectrum presently allocated to each cellular carrier. 47 C.F.R. s 22.900.

In order to implement its market-based proposal, the Commission should promptly establish the co-primary licensing scheme. To accomplish this pursuant to the Commission's statutory responsibility to license spectrum,[9] the Commission should issue a Notice of Proposed Rulemaking ("NPRM") providing for the "grandfathering" of incumbent licensees, and identifying the broad "coordination" spectrum bands below 3 GHz within which the Commission intends to grant specific co-primary PCS licenses once the marketplace coordination with existing licenses has taken place.

In order to afford PCS applicants a reasonable opportunity to obtain sufficient spectrum on the basis of coordination agreements, the "coordination" bands should encompass a substantially larger aggregate amount of spectrum than may actually be needed for PCS usage. CCIR expects that approximately 180-230 MHz of spectrum will initially be needed for PCS (*see* AT&T Comments, at 4). To fulfill this need, a broad "coordination" band should be designated. For this purpose, 1710-2290 MHz[10]—a band which spans the spectrum areas that several parties identified as providing the characteristics desirable for PCS[11]—might be used. This suggested "coordination" band totals 580 MHz of spectrum, or approximately three times the amount of spectrum which the CCIR expects to be needed for PCS use at the outset.[12]

B. PROPOSALS TO EXCLUDE OR RESTRICT POTENTIAL PCS PROVIDERS OR TECHNOLOGIES ARE CONTRARY TO THE PUBLIC INTEREST AND SHOULD BE REJECTED

Various commenters' proposals to impose additional regulatory restrictions or exclusions upon the PCS licensing process should be rejected. For example, the Commission should reject LiTel's suggestion (at 30-31) that AT&T be precluded from competing in this market. There is simply no good reason for the Commission to distort the marketplace by arbitrarily excluding AT&T. Contrary to LiTel's suggestion (at 30-31), AT&T cannot engage in improper cross-subsidies. Most important, AT&T's lack of bottleneck facilities,[13] and the existence of vigorous competition in the interexchange marketplace, preclude such a practice.[14] Also, the Commission's price cap regime prevents overpricing of AT&T's services.[15] Further, the Commission's accounting rules provide yet an additional protection against cross-subsidization.[16]

By the same token, the Commission should reject the suggestion of certain local exchange carriers ("LECs") that spectrum be "set aside" for them, or for cellular licensees, on a favored basis.[17] These LECs' argument that they must be afforded a preferential place as PCS providers in order to assure compatibility with the existing wireline network is wrong.[18] There is no reason why non-LEC providers cannot provide compatibility with the published interfaces and tariffed basic services of the

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[9] 47 U.S.C. Part III.

[10] *See, e.g.*, PCN America, at 22-23; Ameritech, at 13-17. The uses of these bands is summarized in APC, at 10-15. Various government agencies are now assigned to 1710-1850 MHz and 2100-2290 MHz, but should not be precluded from negotiating coordination agreements with one or more PCS providers, if they believe that is appropriate. They may be especially interested in such agreements if the resulting PCS services might themselves be useful to the government agencies involved, as well as to general consumers. *See generally* Bill, *Emerging Telecommunications Technology Act of 1989*, H.R.2965 (and counterpart S. 2904); LiTel, at 18-21. Licensing of such government spectrum will require joint participation by the Commission and NTIA, or Congressional action.

[11] *E.g.*, LiTel, at 7; PCN America, at 22.

[12] In the event that potential PCS providers are able to coordinate more than an aggregate of 230 MHz out of this band for PCS usage, their allocations nevertheless should *not* be arbitrarily restricted. This would simply indicate that the marketplace has valued PCS more highly than existing applications, and more highly than the CCIR expected. Such a market judgment should be respected.

[13] LiTel's claims that AT&T could "discriminate against competitors because of [its] control over wireline access" and "would stall introduction of PCN because of its competition with the [wireline network]" may relate to the local exchange carriers, but are simply inapplicable to AT&T. AT&T does not possess any local "wireline access" monopolies.

[14] Indeed, AT&T has demonstrated in CC Docket No. 90-132 that it is subject to intense competition and lacks market power.

[15] *See In the Matter of Policy and Rules Concern Rates for Dominant Carriers*, CC Docket No. 87-313, Report and Order and Second Further Notice of Proposed Rulemaking, FCC 89-91 (released April 17, 1989), at para. 359, 373.

[16] *See* 47 C.F.R. Part 32.

[17] GTE, at 25; TDS, at 8-12; NTCA Reply, at 2-3; SNET, at 11; Centel, at 21-22; SCTA, at 5; Rock Hill, at 9; Rochester, at 14-20; Bell Atlantic, at 9; SW Sell, at 12; US West, at 13-17; NyNEX, at 14; Contel, at 11-12; SNET, at 10. *A fortiori*, SNET's position (at 11-12) that *only* LECs be allowed to participate should be rejected.

[18] LEC "set asides" were opposed in comments by FMR, at 27-31; Michigan, at 5-6; Paging Network, Inc., at 3-4; PCN America, at 36; LOCATE, at 10 n.14; and Telocator, at 13.

LECs, if and to the extent that consumers demand such compatibility as PCS develops in the marketplace.

Certain cellular carriers opposed the allocation of any spectrum at all for PCS, in part on the ground that they expect to modify their existing cellular services to provide the same benefits as PCS.[19] However, potential PCS providers disagree. For example, PCN America (at 12-20) claims that the cellular carriers' argument is simply untrue for two reasons: first, because analog cellular services may not be able to convert to digital technology quickly enough to provide sufficiently efficient spectrum usage to accommodate a mass PCN market, and second, because a competitive PCS market would better support innovations and price reductions needed for mass PCS services than will the present cellular service "duopolies". LiTel (at 9-11, 14-16) also states that certain PCS technology will permit features which are today unavailable from other services, including cellular services.[20]

The Commission need not attempt to decide which point of view is correct. Rather, consumers (through the marketplace) should ultimately decide. If new PCS services are able to offer advantages (such as improved features or price, or both) over existing cellular carriers, there will be a place in the marketplace for them. Competition between PCS and cellular services, if it eventually ensues, can only benefit the public. On the other hand, if the new PCS services have no benefits to offer, the marketplace will reject them. Thus, the Commission should adopt its proposed market-based approach to PCS spectrum allocation, rather than pre-judging the market acceptance of PCS.

In the same vein, the perceived advantages[21] and disadvantages[22] of CT-2 technology were the subject of dispute among the commenters. Once again, rather than resolve these disputes by regulatory fiat, the Commission should allow the marketplace to test the technology to determine which PCS services will ultimately succeed. This can be accomplished by including CT-2 among those technologies qualifying for the use of spectrum, but without granting exclusive rights in any large block of spectrum to any particular technology.

Similarly, while several commenters sought large allocations for spread spectrum applications, several parties reflected AT&T's concerns about the practicality of spread spectrum PCS services sharing spectrum bands with fixed microwave uses.[23] The Commission does not have to decide this issue in a regulatory proceeding. The Commission's proposed marketplace-based approach to spectrum allocation would cause the sharing issue to be largely resolved by the affected parties on a contractual basis. PCS using spread spectrum techniques may be particularly amenable to this approach, because it is intended to permit coexistence of competing services, albeit with some level of interference. Thus, certain existing users may be willing to accept the greater level of interference which sharing with a spread spectrum application entails, while others may not.

II. THE COMMISSION SHOULD GRANT TIA'S REQUEST FOR ADDITIONAL SPECTRUM FOR CORDLESS TELEPHONES

The NOI requested comment on the Petition of the Telecommunication Industry Association's Personal Communications Section ("TIA") for 25 additional duplex channel pairs in the 46 MHz and 49 MHz bands for cordless telephones. Several parties urged the Commission to act favorably on TIA's Petition.[24] Prompt action is needed to provide this small amount of spectrum to satisfy the immediate needs of the cordless telephone industry.[25] To avoid entangling this matter with PCN allocations generally, the Commission should immediately issue for prompt decision a separate NPRM addressed only to cordless telephones. Because the comments filed in these proceedings are already incorporated in that record NOI at para. 13 n.13), the Commission need afford only a limited period of time for parties to supplement the record before it acts on this second NPRM.

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[19] *See, e.g.*, Cellular Communications, Inc., at 2-6; CTIA, at 4-9; Century Cellunet, Inc., at 2-6; Cellnet, at 2; NYNEX, at 3-8. Among non-cellular providers taking this position is UTC, at 6-8.

[20] *See also* LOCATE, at 9-10.

[21] *See* ACT, at 4-6; APC, Att. A, at 1-3; DSST, at 4; Easyphone, at 5-6; Northern Telecom, at 42-44. As would be expected, United Kingdom interests expressed similar views. EEA, at 2; Ferranti, at 6; GEC Plessey, at 15-20.

[22] *See* AT&T, at 6-7; Ericsson, at 10; LiTel, at 24-26; Rose, at 3-4; NASER, at 4.

[23] *See, e.g.*, American Petroleum Institute, at 13-26; Ameritech, at 13-17; Rockwell, at 2-6. In addition to the AT&T Bell Laboratories study submitted with AT&T's Comments, the American Petroleum Institute (at 13-26 & Appendix B) and Rockwell (at 2-6 & Exhibit 1) in particular submitted detailed studies which also show that such sharing is likely to produce unacceptable levels of interference at any substantial levels of PCS usage. A contrary study submitted by PCN America contains major assumptions which are unjustified, as shown by the AT&T Bell Laboratories Internal Memorandum attached as Appendix 8 hereto.

The comments of AT&T and others (GTE, at 13-14; API, at 23-26> questioned whether spread spectrum "experiments"—including those being conducted by PCN America and other parties who have incentives to demonstrate the viability of such systems—can produce convincing data sufficient to demonstrate an absence of unacceptable interference at substantial PCS penetration levels. Notwithstanding these concerns, AT&T reaffirms its willingness to work with the industry on this issue.

AT&T's Comments (at 8) also noted that it expects premises-based wireless services will require approximately 25 MHz of spectrum in the near future. Ericsson (at 27) agreed that a 20 MHz allocation is appropriate, and MCI (at 8) also sought an allocation for such services.[26] Other commenters suggested that allocations are needed for wireless local area networks, which typically operate within buildings.[27]

The Commission should address the requirements for these low-power premises voice and data products in a proceeding separate from the broader issues raised in the NOI. Much of the market for wireless premises products is for applications that do not require immediate compatibility with wireless public access systems, and thus can be addressed separately from the complicated issues pertaining to the public PCS systems. Moreover, for these applications it will be necessary for the Commission to first adopt technical rules concerning design requirements to deal with the potential for interference from different premises devices operating in close proximity (*e.g.*, in the same office building).

III. THE COMMISSION SHOULD APPOINT AN INDUSTRY ADVISORY COMMITTEE TO CREATE A PCS NUMBERING PLAN

AT&T continues to oppose suggestions[28] that Bellcore be made responsible for establishing the numbering plan for PCS as a modification to the existing North American Numbering Plan ("NANP").[29] Instead, the Commission should appoint an Industry Advisory Committee to begin work on developing a new PCS numbering plan.[30] The Commission will have to appoint such an Advisory Committee in all events, to help the Department of State develop the United States position for CCITT Study Group II, which has accepted the responsibility for developing the technical requirements for a PCS numbering plan internationally. The same Committee could perform both functions.

CONCLUSION

For the reasons stated above and in AT&T's Comments, the Commission should promptly issue separate Notices of Proposed Rulemaking: (i) establishing the regulatory framework for a plan to grant spectrum licenses to PCS applicants under which they would coordinate their PCS usage through agreements with co-primary, "grandfathered" incumbents in the allotted band, (*e.g.*, between 1710-2290 MHz); and (ii) allocating additional spectrum for cordless telephones. The Commission should also appoint an Industry Advisory Committee to develop a new PCS numbering plan.

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[24] AT&T at 7; Dynascan, at 2; Ericsson, at 26; Tandy, at 6; TIA, at 3; TIA Ad Hoc Microcell Committee, at 4-5; Uniden, at 3-5; GTE, at 6. There is no opposition to TIA's request.

[25] In a separate proceeding (Gen. Docket 87-626), the Commission announced on January 11, 1991 that it would permit offset frequencies for cordless telephones. The effect of this on TIA's Petition cannot be determined until the Commission's order is available.

[26] *See also* Ameritech, at 9, 18; Cellular Communications, at 9-12; Ameritech's suggestion that home and office PCS applications should be generally licensed under Part 15 of the Commission's Rules would have to be further investigated as part of the Commission's NPRM proceedings.

[27] *See e.g.*, NCR, at 2-3; FleetCall, at 4-7; Apple, at 2-4; LACE, at 1.

[28] Bellcore, at 4-5; PCN America, at 37-38.

[29] As shown in AT&T's Comments (at 18-19), some PCS providers will likely offer services that will compete with services offered by the Bell Operating Companies, who in turn own Bellcore. Thus, a potential conflict of interest is presented if Bellcore is placed in charge of developing the PCS numbering plan. Because a uniform numbering plan for PCS should be made available to all industry participants on an equal footing, a neutral party should be chosen to develop the PCS numbering plan. Moreover, the PCS numbering plan should not be conceived as a mere extension of the NANP. A prime feature of future PCS will be the ability to provide for nationwide and eventual worldwide roaming. This ability will require a numbering plan that does not have the capacity and other constraints of the present North American and World Numbering plans, contrary to Bellcore's claims.

[30] AT&T's Comments (at 20-21) showed that appropriate technical standards for PCS should generally emerge from existing industry bodies, including the two applicable TIA Committees, Committee T1 approved by the American National Standards Institute, two CCIR working parties, and the applicable CCITT Study Groups.

Respectfully submitted, American Telephone and Telegraph Company.

APPENDIX A

Parties Filing Comments

Advanced Cordless Technologies, Inc. ("ACT")
Alliance of Rural Local Exchange Carriers ("Alliance")
American Mobile Satellite Corporation ("AMSC")
American Personal Communications ("APC")
American Petroleum Institute ("API")
American SMR Network Association, Inc. ("ASNA")
American Radio Relay League, Incorporated ("the League")
American Telephone and Telegraph Company ("AT&T")
Ameritech
Apple Computer, Inc. ("Apple")
Associated Public-Safety Communications Officers, Inc. ("APCO")
Association of the Electronics, Telecommunications and Business Equipment Industries ("EEA")
Bell Atlantic Companies ("Bell Atlantic")
Bell Communications Research, Inc. ("Bellcore")
BellSouth Corporation ("BellSouth")
British Telecommunications plc ("BT")
State of California ("State")
People of the State of California and the Public Utilities Commission of the State of California ("California")
Capital Cities/ABC, Inc.
Telecom Securicor Cellular Radio ("Cellnet")
Cellular Communications, Inc. ("CCI")
Cellular Telecommunications Industry Association ("CTIA")
Centel Corporation ("Centel")
Century Cellunet, Inc. ("Century")
Cincinnati Bell Telephone Company ("CBT")
Contel Corporation ("Contel")
Cooperative Power Association
Cox Broadcasting ("Cox") and Multimedia, Inc. ("Multimedia") ("Joint Parties")
Cox Enterprises, Inc. ("Cox")
Public Service Commission of the District of Columbia ("D.C. PSC")
UK Department of Trade and Industry ("DTI")
Digital Microwave Corporation ("Digital Microwave")
Digital Spread Spectrum Technologies ("DSST")
James A. Dwyer, Jr.
Dynancan Corporation ("Dynascan")
EasyPhone, Inc. (EasyPhone")
The Ericsson Corporation ("Ericsson")
Ferranti Creditphone Limited ("Ferranti")
FleetCall, Inc. ("FleetCall")
FMR Corp. ("FMR")
France Telecom ("FT")
GEC Plessey Telecommunications LTD. ("GPT")
General Instrument Corporation ("GIC")
GTE Service Corporation ("GTE")
H & C Communications, Inc. ("H & C")
Harris Corporation—Farinon Division ("Harris")
Hughes Network Systems, Inc. ("HNS")
Kitsap Cellular, Inc.
LiTel Telecommunications Corporation ("LiTel")
Local Area Telecommunications, Inc. ("LOCATE")
County of Los Angeles, California ("County")
Chandos A. Rypinski ("LACE")
Los Angeles County Sheriff's Department ("LA Sheriff")
McCaw Cellular Communications, Inc. ("McCaw")
MCI Telecommunications Corporation ("MCI")
Mercury Personal Communications Network Ltd. ("MPCN")
Michigan Public Service Commission Staff ("Staff")
Mitsubishi Electric Corporation
Motorola Inc. ("Motorola")
MTEL PCN, Inc.

National Academy of Sciences-National Research Council's Committee on Radio Frequencies ("CORE")
National Aeronautics and Space Administration ("NASA")
National Association of Broadcasters ("NAB")
National Association of Business and Educational Radio, Inc. ("NABER")
National Telephone Cooperative Association ("NTCA")
NCR Corporation ("NCR")
New York State Department of Public Service ("NYSDPS")
Northern Telecom Inc. ("Northern Telecom")
Northwest Iowa Power Cooperative ("NIPCO")
NYNEX Corporation ("NYNEX")
Organization for the Protection and Advancement of Small Telephone Companies ("OPASTCO")
Pacific Telesis Group
Paging Network, Inc. ("PageNet")
PCN Associates PCN America, Inc. ("PCN America")
Puerto Rico Association of Broadcasters ("PRAB")
QUALCOMM, Inc. ("QUALCOMM")
Radio Telecom and Technology, Inc. ("RTT")
Rochester Telephone Corporation ("Rochester")
Rock Hill Telephone Company, Fort Mill Telephone Company and Lancaster Telephone Company ("Rock Hill")
Rockwell International Corporation ("ROCKWELL")
Rose Communications, Inc. ("Rose")
Rural Area Cellular Development Group
South Carolina Telephone Association ("SCTA")
Southern New England Telecommunications Corporation ("SNET")
Southwestern Bell Corporation ("Southwestern Bell")
Special Industrial Radio Service Association ("SIRSA")
Taft Broadcasting Company ("Taft") and Texas Wired Music, Inc. ("TWMI")
Tandy Corporation ("Tandy")
Telocator
Telephone and Data Systems, Inc. ("TDS")
TIA Ad Hoc Microcell Committee ("TIA Microcell Committee")
Telecommunications Industry Association Personal Communications Section ("TIA")
Dr. Michael C. Trahos, D.O., NCE, GET
Uniden America Corporation ("Uniden")
Union Pacific Railroad Company and Missouri Pacific Railroad Company ("Union Pacific")
United Power, Incorporated
U.S. Department of the Interior ("USDI")
United States Telephone Association ("USTA")
USA Mobile Communications, Inc. II ("USA Mobile")
U S West, Inc. ("U S WEST")
Utilities Telecommunications Council ("UTC")
Wireless Cable Association, Inc. ("WCA")

APPENDIX B

AT&T BELL LABORATORIES TECHNICAL MEMORANDUM

DECEMBER 11, 1990.

INTERNAL MEMORANDUM—FROM VASANT K. PRABHU

1. *Introduction*

PCN, America, a subsidiary of Millicom, is requesting the FCC to approve an experimental license to use the 2 GHz band (1850–1990 MHz) for studying the operation of a spread spectrum personal communications network (PCN). This band is presently used to provide point-to-point fixed service (FS) for private microwave networks. In a study prepared by SCS Telecom, Inc. for PCN America, a claim has been made that sharing does not affect the performance of the FS and that spread spectrum can be used to set up PCN in a frequency band occupied by other users (such as FS) without interfering with these existing users or having them interfere with PCN.

Specifically, in the analysis submitted to FCC, SCS Telecom states that if 100 PCN transmitters using 1 mW of transmitted power are located in the main beam of the FS receiver and are 300 feet or more from the FS receiver, no harmful interference will be generated by the PCN system. Furthermore, the claim is made that if PCN transmitter power is reduced to 200 uW, the 100 PCN users can come as close as 100 feet to the FS receiver.[1]

In this note, we show that some of the major assumptions made by Millicom and SCS Telecom are not justified:

- the received carrier power C for FS is about 18 dB higher than normally encountered in practice;
- SCS Telecom assumes that only interference that may degrade FS performance is from the set of PCN transmitters sharing the band. Normally, there are other FS interference exposures and they should be accounted for;
- the propagation mechanism used for calculating interference power from PCN transmitters may not be justified in all situations. The received interference power can be several dB higher than assumed by SCS Telecom.

Therefore, it is felt that careful considerations must be given before sharing is allowed between fixed service and PCN. We have not had time to address all the assumptions made by SCS Telecom. We feel that there may be other assumptions which need be revised and revisited.

2. *Assumptions and Validity*

2.1 Received Power Assumption

On page 3 of Ref. 3, the received carrier power C for the FS is assumed by SCS Telecom to be

- —24 dBm

a number much higher than encountered in practice. Assumption of a higher carrier power can lead to wrong conclusions about the effect of interference.

The parameters of a typical FS link are shown in Table 1. Assuming a link length of 20 miles (average link in private microwave network), the received carrier power is typically —41.2 dBm as show in Table 2.

TABLE 1.—Link Parameters for a Typical 2 GHz FS Link

	Measurement
Frequency	1.9 GHz.
Modulation	64-QAM.
Link length	32 km.
Antenna gain (2.4 m grid antenna)	30 dB.
Antenna beamwidth (3-dB point)	3.2 degrees.
Transmit power	0.5 W (27 dBm).
Antenna center line heights	200 feet (both ends).

For the link parameters in Table 1, the received carrier power can be shown to be

TABLE 2.—Received Carrier Power for a Typical FS Link

	Measurement
Nominal receiver carrier power	—41.2 dBm.

2.2 Assumption on Use of T/I

SCS Telecom uses the threshold-to-interference ratio of

- $(T/I)$of 25 dB

to determine the tolerable interference level from PCN.[4] Even though there is industry disagreement over the use of T/I and the role it should play in determining the interference levels from single exposures (we prefer to use carrier-to-interference ratio C/I to characterize the effect of interference), it is universally accepted that T/I only determines the cumulative interference level that should not be exceeded at any time.

Sine the FS receiver may be subject to other interference exposures (from other nearby FS transmitters, etc.), allocating the interference margin to just PCN interference is really not justified.

For FS it is often assumed that an additional exposure (such as from PCN) should not increase the degradation by more than 10 percent.

2.3 Assumption on Path Loss of PCN Transmitters

SCS Telecom uses the formula

$$L_p=[130+33.5\log R]dB \qquad (1)$$

where R is the distance in km. from the PCN transmitter.

The use of the above formula is based on Ref. 5 and can give a very low value of received interference power into FS receiver.

However, results in Ref. 5 were derived only for the frequency range 150-1500 MHz and their use at 1990 MHz has not been justified by SCS Telecom.

In addition, result in Ref. 5 were derived to compute propagation between land mobile antennas and not between a land mobile antenna and an FS antenna.

Since the antenna characteristics of an FS antenna are quite different from a land mobile antenna, application of Eq. (1) is not justified in all situations.

Further, three separate environments are considered in Ref. 5. The path loss formulas as derived in Ref. 5, and if extended to 2 GHz become

- urban area where

$$L_u=[130+33.5\log R]dB$$

- suburban area where

$$L_s=[L_u-12.28]dB$$

- rural area where

$$L_r=[L_u-49.36]dB$$

Based on these formulas, if a set of PCN sets are located 2 miles from the FS receiver, the path loss variation as a function of the environment is shown in Table 3.

TABLE 3.—Path Loss Between PCN and FS Receiver (2 Miles)

	Measurement
Urban	146.9
Suburban	134.7
Rural	97.6
Free space	108.2

This table also shows the free-space loss given by

$$L_{fs}=[98.08+20\log R]dB \qquad (2)$$

Note that if we blindly use the formulas given in Ref. 5, the path loss in a rural area can be less than the free-space loss often used to compute received power in FS.

Since PCN network can operate in any of the three environments, the analysis should consider all three propagation situations with certain probabilities and determine the statistical expectation of each of them. The SCS Telecom only considers the urban case, where Ref. 5 gives the highest loss (146.9 dB) and which may not be justified in all metropolitan areas.

Indeed, it can be shown that propagation in suburban and rural environments does not have as great a loss as assumed by SCS Telecom. In these environments level of interference that can be received can be several orders of magnitude higher than that assumed by SCS Telecom.

3. Summary

Several assumptions made by Millicom in their analysis of FS systems due to the overlaying of a PCN network are shown to be not justified.

Specifically,

- Received carrier power of —24 dBm is rarely encountered in practice;
- There are other sources of interference in the FS receiver and interference from PCN should be treated as just one possible exposure.
- Propagation model may not be valid under all conditions and actual interference power received by the FS system may be several dB higher than assumed in the analysis.

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ISBN 0-16-035530-3

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